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CONFERENCE IN THE MATTER OF POLLUTION OF THE INTERSTATE WATERS OF THE MONONGAHELA RIVER AND ITS TRIBUTARIES. VOLUME I. HELD AT PITTSBURGH, PENNSYLVANIA ON DECEMBER 17, 1963

Public Health Service
Washington, D. C.

17 December 1963

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in the matter of

Pollution of the Interstate Waters of the

MONONGAHELA RIVER AND ITS TRIBUTARIES

Volume I

December 17, 1963
Pittsburgh, Pennsylvania

U.S. Department of Health, Education, and Welfare
Washington, D.C.

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U.S. Department of Health, Education, and Welfare
Washington, D.C.

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Conference in the Matter of Pollution of the Interstate Waters of the Monongahela River and Its Tributaries (Maryland-West Virginia-Pennsylvania), convened **at 9:30 a.m., Tuesday, December 17, 1963, at the Pittsburgh-Hilton Hotel,** Pittsburgh, Pennsylvania.

PRESIDING:

Mr. Murray Stein, Chief, Enforcement Branch, Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare. Washington 25, D. C.

CONFEREES:

Dr. Charles Wilbar, Chairman of the Sanitary Water Board, and Secretary of Health, State of Pennsylvania

Mr. Paul W. McKee, Director, Maryland State Water and Pollution Control Commission

Mr. Robert M. Brown, Chief, Bureau of Environmental Hygiene, State Department of Health, State of Maryland

Mr. Bern Wright, Water Resources Division, State Department of Natural Resources, State of West Virginia

CONFEREES (Continued):

Mr. Tom Yost, representing the State of West Virginia

Mr. Joseph R. Shaw, Chairman of the Ohio River Valley Water Sanitation Commission

Mr. Earl J. Anderson, United States Public Health Service, Room 1049, 42 Broadway, New York 4, New York

PARTICIPANTS:

Hon. Jennings Randolph, United States Senator from the State of West Virginia

George W. Whetstone, District Chemist, United States Geological Survey

G. A. Howell, Assistant to Vice President, United States Steel Corporation, representing the Pennsylvania State Chamber of Commerce

Ernst P. Hall, Research Consultant, Consolidation Coal Company, representing the mining industry

PARTICIPANTS (Continued):

John E. Costello, Esq., Chairman, Resolutions Committee, Pennsylvania Municipal Authorities Association

F. R. Perrin, Chief Chemist, South Pittsburgh Water Company, on behalf of the Pennsylvania Section of the American Water Works Association

Hon. John Laudadio, Member of the House of Representatives, Commonwealth of Pennsylvania, on behalf of the Pennsylvania Federation of Sportsmen's Clubs

F. C. Perkins, President, Pennsylvania Division, Izaak Walton League of America, Inc.

A. D. Sidio, Public Health Engineer, Pollution Evaluation Unit, United States Department of Health, Education, and Welfare, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio

G. W. Josephson, Bureau of Mines, Department of the Interior

Gerald G. Taylor, Fishery Biologist, Bureau of Sport Fisheries and Wildlife, Department of the Interior, Pittsburgh, Pennsylvania

William D. Henning, Esq., Allegheny County Sportsmen's League

PARTICIPANTS (Continued):

Francis X. McCulloch, Esq., Allegheny County Boroughs Association

Dr. Meredith Thompson, Assistant Commissioner for Environmental Services, New York State Department of Health

Everett Thayer, private citizen, Foot of West North Avenue, Pittsburgh 33, Pa.

R. J. Boes, Sanitary Engineer, ORSANCO

OTHERS IN ATTENDANCE:

Thomas E. Urquhart, Morgantown Water Commission, 198 Foundry Street, Morgantown, West Virginia

F. W. Montonari, New York Water Resources Commission, State Campus, Albany, New York

John H. Harrington, Pennsylvania Department of Commerce, Room 410 South Office Building, Harrisburg, Pennsylvania

Robert R. Bowers, West Virginia Department of Commerce, Director, Travel Development, Charleston, West Virginia

Warden M. Lane, Department of National Resources, Charleston, West Virginia

Albert M. Day, Pennsylvania Sanitary Water Board, Harrisburg, Pennsylvania

Leonard Weakley, Counsel, ORSANCO, Cincinnati, Ohio

General Norman M. Lack, Water Research Foundation, Room 1132, Wilmington Trust Building, Wilmington 3, Delaware

D. F. Paddock, Pennsylvania Sanitary Water Board, 147 - 7th Avenue, Clarion, Pennsylvania

Lyhle E. Gillenwater, West Virginia Department of Natural Resources, Assistant Chief,

OTHERS IN ATTENDANCE (Continued):

Division of Water Resources, 410 - 38th Street, Charleston, West Virginia

Dr. M. K. McKay, Pennsylvania Sanitary Water Board, 526 City Company Building, Pittsburgh, Pennsylvania

Harold Shea, West View Water Authority, 441 Perry Highway, Pittsburgh, Pa.

Robert J. Moran, Allegheny Co. Sanitary Authority, General Superintendent, 3300 Preble Avenue, Pittsburgh, Pennsylvania

Leon Wald, Allegheny County Sanitary Authority, Executive Director, 3300 Preble Avenue, Pittsburgh, Pennsylvania

J. W. Wark, U. S. Geological Survey, 3 North Perry Street, Rockville, Maryland

John Sullivan, U. S. Department of the Interior, Bureau of Outdoor Recreation, U. S. Court House, Philadelphia, Pennsylvania

Herbert A. Howlett, Delaware River Basin Commission, Chief of Planning, 25 Scotch Road, Trenton, New Jersey

Mrs. Ruth G. Maley, West Virginia Department of Commerce, Public Works Coordinator, Charleston, West Virginia

OTHERS IN ATTENANCE (Continued)

Andrew Z. Hanson, West Virginia Department of Commerce, Charleston, West Virginia

M. R. Watts, Allegheny Committee Sportsmen League, 200 Walton Lane, Springdale, Pennsylvania

James H. Banning, Pennsylvania Fish Commission, 1003 Grandview Avenue, Connellsville, Pennsylvania

Russell Blair, Pennsylvania Federation of Sportsmen's Clubs, Perryopolis, Pennsylvania

W. E. Guckert, Allegheny County Sports League, Secretary, Allegheny County, 2818 East Street, Pittsburgh 14, Pennsylvania

D. J. Sheridan, U. S. Army Corps of Engineers, Civil Engineer, Manor Building, Pittsburgh, Pennsylvania

E. N. Cole, U. S. Army Engineer District, Manor Building, 564 Forbes Avenue, Pittsburgh, Pennsylvania

Cdr. O. T. Sturdy, USCG, Officer in Charge, 1212 Park Building, Pittsburgh 22, Pennsylvania

Albert Frost, Captain, USCG, Assistant Chief Law Enforcement Division, 1300 E. St., N.W., Washington, D. C.

OTHERS IN ATTENDANCE (Continued):

J. E. Slupecke, Pennsylvania Municipal Authorities Association, Harrisburg, Pennsylvania

Nick Stratakis, Pennsylvania Department of Health, 300 Liberty Avenue, Pittsburgh 22, Pennsylvania

Dr. Coughlin, Pennsylvania Department of Health, 300 Liberty Avenue, Pittsburgh 22, Pennsylvania

Philip A. Brunn, Jr., Chairman, McCandless Twp. Sanitary Authority, 9955 Grubbs Road, Wexford RD#1, Pennsylvania

Frank W. Siegert, Allegheny County Health Department, 2813 Versailles Avenue, McKeesport, Pennsylvania

R. T. Laing, Box 230, Altoona, Pennsylvania

Vernon Fritsliman, Rochester & Pittsburgh Coal Company, Indiana, Pennsylvania

Richard Todlunter, Barnes and Tucker Coal Company, Barnesboro, Pennsylvania

Earl Glass, Western Pennsylvania Coal Operators Association, 715 Oliver Building, Pittsburgh 22, Pennsylvania

Stanley Longwill, Fort Hill - Apartment D-1, Doylestown, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

E. L. Bussey, Pennsylvania Electric Company, Director of Committee Relations, Oakland, Maryland

J. R. Boes, Chemical Engineer, ORSANCO

William Jennings, ORSCANCO Committee, ORSANCO, Lewisburg, West Virginia

Howard Hardesty, Jr., Consolidation Coal Company, General Counsel, Koppers Building, Pittsburgh, Pennsylvania

Glen O. Fortney, State Department of Health, Division of Sanitary Engineering, Chief, Engineering Section, Charleston, West Virginia

Richard M. Boardman, Pennsylvania State Department of Health, Chief, Stream Quality Section, P. O. Box 90, Harrisburg, Pennsylvania

Joseph P. Smurda, Pennsylvania Department of Health, Regional Sanitary Engineer, 300 Liberty Avenue, Pittsburgh, Pennsylvania

Edmund Taylor, Pennsylvania Department of Health Sanitary Engineer, 300 Liberty Avenue, Pittsburgh 22, Pennsylvania

Edward W. Monroe, Pennsylvania Department of Health Sanitary Engineer, 300 Liberty Avenue, Pittsburgh, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

Karl W. Mason, Pennsylvania Department of Health, Director, Bureau of Environmental Health, Harrisburg, Pennsylvania

Donald A. Lazarchik, Pennsylvania Department of Health Chief, Industrial Wastes Section, P. O. Box #90, Harrisburg, Pennsylvania

William M. Gross, Pennsylvania Department of Health, Assistant Attorney General, 1015 Health and Welfare Building, Harrisburg, Pennsylvania

John L. Robinson, Allegheny County Health Department, Public Health Engineer, 1509 Andrea Drive, Pittsburgh 39, Pennsylvania

Robert J. Drake, the Cleveland Plain Dealer, Reporter, Cleveland 14, Ohio

C. H. LeRoy, 621 Saxonburgh Road, Pittsburgh Pennsylvania

Eugene R. Elkins, West Virginia League of Municipalities, 316 Wagner Road, Morgantown, West Virginia

Charles Thornton, Thayer Committee Committeeman, 703 River Avenue, Pittsburgh, Pennsylvania

Arthur Lilly, Thayer Committee Committeeman, 78 Belvidere Street, Pittsburgh 5, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

Karl Smith, 532 Penn Street, New Bethlehem, Pennsylvania

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Preston E. Jordan, Consultant, Box #602, Follansbee, West Virginia

F. W. Kittrell, U. S. Public Health Service, Chief, Pollution Evaluation, 4676 Columbia Parkway, Cincinnati, Ohio

C. W. Fisher, Koppers Company, Koppers Building, Manager Effluent Services, Pittsburgh 19, Pennsylvania

E. J. Mills, Jr., Union Carbide Corporation, South Charleston, West Virginia

G. F. Eisele, the Puve Oil Company, ORSANCO, Technical Superintendent (Health Refinery), Route #15, Newark, Ohio

Robert F. Rocheleau, E. I. Dupont, Engineering Department, Waste Consultant, Wilmington 98, Delaware

W. H. Jukkola, Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

Hayse H. Black, U.S. Public Health Service, Industrial Wastes Consultant, 4676 Columbia Parkway, Cincinnati 26, Ohio

C. R. Parrish, West Penn Power Company, Hydrographer, Cabin Hill, Greensburg, Pennsylvania

Robert J. McAllister, Duquesne Light Company, 435 Sixth Avenue, Pittsburgh 19, Pennsylvania

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Larry Cook, Coal Industry Advisory Committee to ORSANCO, 33 N. High Street, Columbus, Ohio

William E. Hess, S&L Steel Corporation, California, Pennsylvania

Edward J. Cleary, ORSANCO, 1755 Massachusetts Avenue, N. W., Washington, D. C.

William L. Klein, ORSANCO, 414 Walnut Street, Cincinnati, Ohio

OTHERS IN ATTENDANCE (Continued):

Tom Crabtree, Public Affairs Representative, ORSANCO, 414 Walnut Street, Cincinnati, Ohio

David A. Dunsmore, ORSANCO, 4141 Walnut Street, Cincinnati, Ohio

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Robert K. Horton, ORSANCO, Acting Director, 414 Walnut Street, Cincinnati 2, Ohio

Dr. N. H. Diper, ORSANCO, 1800 Washington Street, Charleston, West Virginia

Charles R. Collier, U. S. Geological Survey, Hydraulic Engineer, 2822 E. Main Street, Columbus, Ohio

S. K. Love, U. S. Geological Survey, Chief, Quality of Water Branch, Washington, D. C.

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William A. Baker, Pennsylvania Department of Mines & Mineral Industries, Administrative Officer, 9 N. Front Street, Pittsburgh, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

Stephen Krickovic, U. S. Bureau of Mines, Mining Methods Research Engineer, 4800 Forbes Avenue, Pittsburgh 13, Pennsylvania

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E. R. Palowitch, Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pennsylvania

W. F. Eigenbrod, West Virginia Department of Mines, Director, Room 151 E. Capitol Building, Charleston 5, West Virginia

Walter C. Lorenz, U. S. Bureau of Mines, Chemical Engineer, 4800 Forbes Avenue, Pittsburgh, Pennsylvania

Robin A. Van Meter, U. S. Bureau of Mines, 11205 Waycross Way, Kensington, Maryland

Mrs. James Walsh, League of Women Voters, 1287 Arrowood Drive, Pittsburgh, Pennsylvania

Mrs. Ralph W. Ryan, League of Women Voters, 158 High Street, Morgantown, West Virginia

Mrs. Earl Sprouse, League of Women Voters, 17 McKinley Street, Morgantown, West Virginia

Mrs. A. H. Van Landingham, League of Women Voters, 201 Garden Street, Morgantown, West Virginia

OTHERS IN ATTENDANCE (Continued):

R. S. Maize, Allied Chemical Corporation, Mill Street, Newell, Pennsylvania

C. R. Walbridge, Allied Chemical Corporation, General Chemical Division, P. O. Box 70, Morristown, New Jersey

O. C. Thompson, Consultant, Union Carbide Corporation, Chemicals Division, P. O. Box 8004, South Charleston 3, West Virginia

Homer W. Fry, Plant Manager, Pittsburgh Chemical Company, 110 Pine Acre Lane, Coraopolis, Pennsylvania

John E. Kinney, 1910 Cambridge Road, Ann Arbor, Michigan

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Robert Norcross, West Virginia Coal Association, 1721 Kanawha Valley Building, Charleston, West Virginia

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Walter F. Schulten, Vice President, Consolidation Coal Company, Koppers Building, Pittsburgh 19, Pennsylvania

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Louis F. Birkel, Republic Steel Corporation, Cleveland, Ohio

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Paul D. Simmons, National Steel Corporation, Research and Development, Weirton, West Virginia

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OTHERS IN ATTENDANCE (Continued):

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C. A. Bishop, U. S. Steel Corporation, 525 William Penn Place, Pittsburgh, Pennsylvania

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D. S. Cunningham, The Valley Camp Coal Company, Box 218, Triadelphia, West Virginia

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Walter C. Gumbel, Conservationist, Fairmont, West Virginia

A. C. Hyde, E. I. DuPont, Belle, West Virginia

William Foster, Sr. General Attorney, U. S. Steel Corporation, 525 William Penn Place, Pittsburgh, Pennsylvania

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OTHERS IN ATTENDANCE (Continued):

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Donald J. Motz, Waste Control Engineer, Shenango Incorporated, Neville Island, Pittsburgh 25, Pennsylvania

W. Fullerton, Senior Technologist, U. S. Steel Corporation, Applied Research Laboratory, Monroeville, Pennsylvania

John C. Draper, Mining Engineer, Duquesne Light Company, 435 Sixth Avenue, Pittsburgh 19, Pennsylvania

Edgar A. Pash, Project Geologist, 303 Methodist Building, U. S. Public Health Service, Wheeling, West Virginia

Charles W. Northington, Public Health Service, Director Lake Erie Field Station, 7298 York Road, Cleveland 30, Ohio

OTHERS IN ATTENDANCE (Continued):

Lowell A. Vandenberg, Public Health Service, Senior Assistant Sanitary Engineer, 4676 Columbia Parkway, Cincinnati, Ohio

Kenneth M. Mackenthun, Public Health Service, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio

Ben J. Gryctko, Department of Health, Education, and Welfare, 300 Independence Avenue, S.W., Washington 25, D. C.

Harold F. Clark, Bacteriologist, 4676 Columbia Parkway, Cincinnati 26, Ohio

Thomas G. Frangos, United States Public Health Service, New York Regional Office, New York 4, New York

Graham Walton, Robert A. Taft Sanitary Engineering Center, Sanitary Engineer, 4676 Columbia Parkway, Cincinnati, Ohio

Robert J. Adams, Merrill, Lynch, Pierce, Fenner & Smith, 2 Gateway Center, Pittsburgh, Pennsylvania

John F. Perry, Merrill, Lynch, Pierce, Fenner & Smith, #2 Gateway Center, Pittsburgh 2, Pennsylvania

Walter A. Lyon, Pennsylvania Department of

OTHERS IN ATTENDANCE (Continued):

Health, Director, Division of Sanitary Engineering, P. O. Box 90, Harrisburg, Pennsylvania

Ralph E. Dwork, Pennsylvania Department of Health, Deputy Secretary, 4204 Cotswold Drive, Harrisburg, Pennsylvania

John H. Murdoch, Pennsylvania Department of Health, Public Relations, Harrsiburg, Pennsylvania

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Richard A. Vanderhoof, Public Health Service, 4676 Columbia Parkway, Cincinnati 26, Ohio

Richard D. Hoak, Mellon Institute, Senior Fellow, 4400 Fifth Avenue, Pittsburgh, Pennsylvania

Charles R. Jenkins, Assistant Professor of Sanitary Engineering, Department of Civil Engineering, West Virginia University, Morgantown, West Virginia

John M. Nutt, University of Pittsburgh, 318 Engineering Hall, Pittsburgh 13, Pennsylvania

Julian B. Andelman, Graduate School of Public Health, University of Pittsburgh, Assistant Professor of Water Chemistry, Pittsburgh 13, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

George Quiter, Student, University of Notre Dame, 1110 Pinewood Drive, Pittsburgh 16, Pennsylvania

Jerry C. Burchinal, Professor, Civil Engineering, West Virginia University, Morgantown, West Virginia

William C. Pendleton, Associate Professor, University of Pittsburgh, 211 S. Dithridge Street, Pittsburgh 13, Pennsylvania

Paul V. Morgan, University of Pittsburgh, Graduate School of Public Health, Research Fellow, 130 DeSoto Street, Pittsburgh 13, Pennsylvania

Chester C. Kisiel, University of Pittsburgh, Assistant Professor of Civil Engineering, Room 320, Engineering Hall, Pittsburgh 13, Pennsylvania

Phillip Antommaria, Graduate School of Public Health, University of Pittsburgh, Graduate Fellow, 320 G Street, Pittsburgh 13, Pennsylvania

Michael E. Jensen, U. S. Public Health Service, S.A.S.E., 303 Methodist Building, 11th and Chapline Streets, Wheeling, West Virginia

M. LeBosquet, U. S. Public Health Service, Special Assistant to Chief, DWSPC, Room 3026, Department of Health, Education, and Welfare, South, Washington 25, D. C.

OTHERS IN ATTENDANCE (Continued):

William A. Rosenkrans, U. S. Public Health Service, Deputy Regional Program Director, 700 E. Jefferson Street, Charlottesville, Virginia

Harry A. Sutler, Western Pennsylvania Coal Operations Association, 715 H. W. Oliver Building, Pittsburgh, 22, Pennsylvania

Joseph Abate, Smith Township Authority, Box 314, Slovan, Pennsylvania

Franklin H. Mohney, Independent Mineral Producers Association, Butler, Pennsylvania

Ed Paulson, Hall Labs Division, Calgon Corporation, P. O. Box 1346, Pittsburgh 30, Pennsylvania

Maurice A. Shapiro, University of Pittsburgh, Graduate School of Public Health, Associate Professor of Sanitary Engineering, Pittsburgh, Pennsylvania

J. H. Neilan, Somerset, Pennsylvania

Joseph Yablonski, 938 Penn Avenue, Pittsburgh, Pennsylvania

John Seddon, United Mine Workers of America, 938 Penn Avenue, Pittsburgh 30, Pennsylvania

F. J. Stevenson, Southwestern Pennsylvania Regional Planning Commission, 200 Ross Street, Pittsburgh 19, Pennsylvania

OTHERS IN ATTENDANCE (Continued):

George W. Keener, Box 230, Clarion, Pennsylvania

Clair R. Kime, Box 230, Clarion, Pennsylvania

John E. Richards, Ohio Department of Health, Columbus 15, Ohio

George H. Eagle, Ohio Department of Health, Columbus, Ohio

Nick Stratakis, Pennsylvania Department of Health, 300 Liberty Avenue, Pittsburgh 22, Pennsylvania

L. J. Potter, U. S. Public Health Service, Cincinnati, Ohio

C. T. Newton, Swindell-Dressler Company, Manager of Public Works, 441 Smithfield Street, Pittsburgh, Pennsylvania

Carl A. White, President, Pennsylvania Federation of Sportsmen's Clubs, Avonmore, Pennsylvania

Dr. F. E. Coughlin, Pennsylvania State Department, Pittsburgh, Pennsylvania

R. B. Adams, Wilkinburg, Pennsylvania, Joint Water Authority

OTHERS IN ATTENDANCE (Continued):

Peter Ruh, Public Health Service, Washington, D. C.

Mort Lebow, Public Health Service, Washington, D. C.

Kenneth Biglane, Public Health Service, Washington, D. C.

Mrs. Rheta Piere, Public Health Service, Washington, D. C.

PROCEEDINGS

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: The conference is open.

This conference in the matter of pollution of the interstate waters of the Monongahela River and its tributaries, involving the States of Maryland, West Virginia, Pennsylvania, the Ohio River Valley Water Sanitation Commission and the Department of Health, Education, and Welfare, is being held under the provisions of Section 8 of the Federal Water Pollution Control Act.

Under the provisions of that Act, the Secretary of Health, Education, and Welfare is required to call a conference of this type, when on the basis of reports, surveys, or studies he has reason to believe that pollution of interstate waters subject to abatement under the Federal Act is occurring.

The purpose of the conference is to bring together the State and interstate water pollution control agencies, the representatives of the Department of Health, Education, and Welfare, and other interested parties to review the existing situation, the progress which has been made, and to lay a basis for future action by all parties concerned; and to give the States, localities and industries an opportunity to take any remedial action which may be indicated under the State and local law.

The conference technique is a rather old one. It is used by many State agencies informally in the normal conduct of their business in the field of water pollution control. The concept of the conference was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York against New Jersey involving interstate pollution. I would like to quote from this Court opinion:

> "We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal presented by the large and growing population living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court however constituted."

Opening Statement - Mr. Stein

We strongly support the conference technique and we measure our success by the situations which are solved at the conference stages, rather than by the court actions we bring.

As provided for in Section 8 of the Federal Water Pollution Control Act, The Secretary of Health, Education, and Welfare has notified the official State and interstate water pollution control agencies of this conference. These agencies are the Maryland State Department of Health, Bureau of Environmental Hygiene; the Pennsylvania Department of Health, Sanitary Water Board; the West Virginia Department of Natural Resources, Division of Water Resources; and the Ohio River Valley Water Sanitation Commission. Conferees representing these agencies are:

Dr. Charles Wilbar, Chairman of the Sanitary Water Board from Pennsylvania;

Mr. Paul W. McKee and Mr. Robert M. Brown from Maryland;

Mr. Bern Wright and Mr. Tom Yost from West Virginia;

Mr. Joseph Shaw from the interstate agency; and

Mr. Earl J. Anderson for the Federal agency.

My name is Murray Stein. I am from Washington, D. C., headquarters of the Department of Health, Education, and Welfare.

The representatives of the official agencies are privileged to bring whomever they wish to the conference and have them participate in the conference. However, this is a conference between the State and interstate representatives and the representatives of the Department of Health, Education, and Welfare, and these parties constitute the conferees.

Both the States and the Federal Government have responsibilities in dealing with interstate water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and control interstate pollution. It has always been the policy of the Department of Health, Education, and Welfare to give full recognition to this traditional role of the States. The function of the Department is to encourage the States in these activities. However, this Department is charged by law with specific responsibilities in connection with interstate pollution control problems.

The Federal Water Pollution Control Act provides that pollution of interstate waters, whether the matter causing or contributing to such pollution is discharged directly into such waters or reaches such waters after discharge into a tributary of such waters which endangers the health or welfare of persons in a State other than that in which the discharges originate, is subject to abatement. The conference will be useful, we hope, in providing a clear picture of the problem, in delineating the progress which has already been accomplished, and in indicating what still needs to be done to correct the problem in these interstate waters.

Under the Federal law the Secretary is required at the conclusion of the conference to prepare a summary of it which will be sent to all the conferees. The summary, according to law, must include the following:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act;

2. Adequacy of measures taken toward abatement of the pollution; and

3. Nature of delays, if any, being encountered in abating the pollution. Subsequent to the holding of a conference, the Secretary of Health, Education, and Welfare is required to make recommendations for remedial action if such recommendations are indicated.

Now, a word about the procedure governing the conduct of the conference. A record and verbatim transcript will be made of the conference by Mr. A. M. Zimmer. Mr.

Zimmer is making this transcript for the purpose of aiding us in preparing a useful summary, and also providing a complete record of what is said and done here. We will make copies of the summary and transcript available to the official water pollution control agencies of Maryland, West Virginia, Pennsylvania and the interstate commission. We have found that generally for the purpose of maintaining relationships within a region and a State that the people who wish summaries and transcripts should request them through their State or interstate agency, rather than to come directly to the Federal Government. The reason for this is that we would prefer the people who are interested in the problem to follow their normal relations in dealing with State agencies rather than the Federal Government on these matters when the conference has been concluded. This has worked successfully in the past and we will be most happy to make this material available to the agencies for distribution.

All the conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. At the conclusion of such statements, the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the conferees' comments and questions, I may ask a question too. This procedure has proven effective in the past in developing a clear statement of the problem and in reaching agreements on equitable solutions. At the end of all the statements, we will have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation. Then we will attempt to summarize the conference orally, giving the conferees, of course, the right to amend or suggest modifications of the summary. I would suggest that all speakers other than the conferees come to the lectern and identify themselves for the record when making their statements.

At this point, it is indeed my privilege to introduce a man who is the senior member of the Senate Public Works Committee and its Special Subcommittee on Air and Water Pollution, and a man who has been a statesman in the field of water and air pollution control. In no small measure he has been an architect of the Federal program and, indeed, the national program in this area.

He is the Honorable Jennings Randolph, United States Senator from West Virginia.

Senator Randolph.

(Applause.)

Senator J. Randolph

STATEMENT OF THE HONORABLE JENNINGS RANDOLPH, UNITED STATES SENATOR FROM THE STATE OF WEST VIRGINIA

SENATOR RANDOLPH: Chairman Murray Stein, ladies and gentlemen and members of the conference:

I am confident that your work will go forward here today in Pittsburgh in a spirit of cooperation and mutual regard with respect to all levels of governmental responsibilities. This is necessary for better understanding, as well as desired results.

Municipal officials, industry leaders and responsible citizens in the Morgantown and Fairmont areas have assured me of their concern, and cooperation within their capabilities.

I shall follow the proceedings closely, and I would want to make it very clear, Mr. Stein, that you, and all those who are in the process of determination and decision-making, may be assured of my continued interest, intense interest, in finding with you a satisfactory solution to the problems of pollution abatement in this important river.

As I understand it, today we function within the framework of the democratic process, and that is the way it should be. This is not a court in any sense of the word, although the gentlemen here rather have that type of demeanor this morning. Perhaps the weather makes them a little more serious, or, at least, they are in the shadow of this room. But it is a conference, exploratory in nature to a degree, findings of course to be outlined and then to be assessed.

I am confident with you that there need be nothing coming from this meeting which will do other than contribute to understanding, to appreciation of the problems, and to mutual respect.

Mr. Stein, sometimes we think there are two sides to a question. This is an oversimplification. We can't polarize our opinions in a matter of this type. There are as many sides to a question, ladies and gentlemen, as there are parties at issue, and those who are intensely interested in finding this solution.

So, it is in this sense, I am sure, that your conference moves forward.

I am grateful for this privilege and for this responsibility for having had the opportunity to make these few brief remarks -- I emphasize "few" and "brief" -- at the outset of what I believe to be a most productive and constructive conference.

(Applause.)

MR. STEIN: Thank you very much, Senator, for a truly inspirational statement.

I think you can see why the Senator is one of the senior statesmen in the United States, who formulates our water pollution control policy and legislation. At least on the Federal level, he is generally regarded as practically our chairman of the board of directors.

At this point, to proceed with the conference, we would like to call on the representative of ORSANCO, Mr. Shaw, for the presentation of that interstate agency. Mr. Shaw.

STATEMENT OF JOSEPH R. SHAW, CONFEREE AND CHAIRMAN, OHIO RIVER VALLEY WATER SANITATION COMMISSION

MR. SHAW: Thank you, Mr. Stein.

My name is Joseph R. Shaw. I am a conferee and Chairman of the Ohio River Valley Water Sanitation Commission. I am also president of Associated Industries of New York State.

Mr. Chairman, conferees, ladies and gentlemen:

As Chairman of the Ohio River Valley Water Sanitation Commission, which is commonly known as ORSANCO, I wish, first, to assure the conferees and all those present of the support and cooperation of this Commission in any realistic effort to hasten abatement of pollution in the Monongahela River.

In order to facilitate the conduct of this conference, and to further a spirit of cooperation among the agencies involved, the Commission and its signatory States requested that there be an opportunity for a meeting with representatives of the Department of Health, Education, and Welfare prior to the holding of this conference. Such a pre-conference meeting was held yesterday afternoon.

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Since the language of the Federal Water Pollution Control Act does not specify procedures by which conferences of this nature shall be conducted, there are serious legal questions regarding such matters as the manner in which the Chairman of the Conference is selected and the agenda of material to be covered.

The meeting yesterday was helpful in clarifying some of these issues. We believe that if properly exploited, the pre-conference technique can be most productive in clarifying some of the confusion surrounding proceedings of this type.

Now, with regard to the issues specifically involved at this meeting, the Ohio River Valley Water Sanitation Commission was created by eight States in the Ohio Valley, acting under authority granted by the Congress of the United States, for the purpose of conducting a regional program of water pollution control.

The eight States voluntarily assumed leadership in devising a means whereby they might pool their resources and their police powers to do what no one of them could do alone.

The means they found appropriate was the use of an interstate compact -- a treaty, if you please, whereby the legislatures of each of the States pledged to each other faithful cooperation in the development and execution of a regional attack on pollution. Negotiations for this treaty were virtually completed at the outbreak of World War II, and then were brought to a halt because of the war effort. On completion of the war, negotiations were resumed and in 1948 the compact was signed by the Governors of the States of Illinois, Indiana, Kentucky, New York, Ohio, Pennsylvania, Virginia and West Virginia.

The compact provided for establishment of a commission consisting of three representatives from each State appointed by the Governor of the State, and three representatives appointed by the President of the United States. The role of the commissioners is to administer an interstate program of stream cleanup, allotting to each State definite responsibilities for securing compliance from municipalities and industries in prevention of pollution Most importantly, the Commission is clothed with powers of enforcement should a State prove unable or unwilling to deal with specific cases of pollution.

It should be emphasized at this point that the State fully recognized the desirability of providing a place on the interstate commission for integration of Federal interests in the matter of pollution control. In fact, the Ohio River Valley Water Sanitation Commission is the only interstate agency on which are represented the United States Public Health Service, the United States Corps of Engineers, and the United States Department of the Interior.

Ladies and gentlemen, let us consider what has been done.

The three major components of pollution control to which the States addressed themselves under the auspices of their interstate commission were: Abatement of sewage pollution from municipalities; control of industrial waste; and the curbing of acid drainage. How well the States are redeeming their pledge of cooperation in dealing with these matters is revealed in a record of accomplishment that has no parallel elsewhere in the nation.

For example, when ORSANCO came into existence fifteen years ago, less than one percent of the population living in the six States, that is, in the municipalities on the Ohio River provided facilities for treatment of sewage; today 98-½ percent are operating or constructing such facilities. Meantime, similar cleanup efforts have been advanced on tributaries to the Ohio River. The valley-wide crusade represents an investment by municipalities of almost a billion dollars.

The unprecedented reversal of half a century of river abuse in such a short period of time -- and the sheer magnitude of the undertaking -- have merited one of the greatest accolades in the nation. Last May the American Society of Civil Engineers designated the Ohio River Basin Clean Streams Program as the recipient of its outstanding achievement award.

With respect to the complex problem of industrial waste control, significant progress has been made by the eight States on securing compliance with interstate obligations, although much more remains to be done. Now that nine-tenths of the municipal program has been completed, the States are in a position to concentrate efforts on furtherance of industrial control measures.

Regarding the mine acid drainage problem, the Commission has conscientiously promoted action on this endeavor, with the result that progress has been made despite great odds. Not the least of these odds is the psychology of defeatism that has been exhibited by both the industry and the scientific profession as to their ability to cope with the problem. Since this conference is concerned with mine drainage pollution, it is appropriate to highlight some of the endeavors of ORSANCO.

Acid Mine Drainage Developments

First, it might be noted that in 1950 (2nd Annual

Report, pp. 29-34) the Commission devoted a substantial part of its annual report to the Governors of the signatory States to an appraisal of the mine acid problem, to an analysis of the legal position with regard to control, and to the possibilities of promoting corrective action.

How baffling the problem was regarded is revealed by the fact that some of the States actually exempted mine drainage from regulatory control, because in their view, means were not available to deal with it. Meantime, it should be pointed out, the Commonwealth of Pennsylvania was addressing itself in vigorous fashion to the matter. Not only did it support scientific research, but, more importantly, the Pennsylvania Sanitary Water Board promoted the application of practices at mining operations that minimized the effect of mine drainage.

In developing its program the Commission decided, among other things, that it would invite leaders of the coal industry to participate in seeking solutions. This brought about the establishment in 1951 of the ORSANCO Coal Industry Advisory Committee. In addition, the Commission sought to enlist the collaboration of two Federal agencies -- the United States Public Health Service and later the United States Bureau of Mines. On July 12, 1956, a resolution was adopted petitioning the Surgeon General of the Public Health Service to consider inauguration of investigations looking toward the prevention, reduction and control of acid mine drainage. It was hoped that this petition might influence the Public Health Service to give cognizance to the problem in its expanding research programs. Meantime, possibilities of participation by the United States Bureau of Mines were explored.

Nothing fruitful emerged from either of these efforts. In retrospect, it appears that while the Public Health Service had money for research, matters other than the mine acid problem were given a higher priority; and although the Bureau of Mines displayed interest, it had virtually no funds for this purpose.

Unwilling to be deterred by this unsatisfactory state of affairs, the Engineering Committee of ORSANCO began gathering evidence that suggested possibilities of doing something that would curb the indiscriminate discharge of mine drainage. Much of this evidence came from experiences in Pennsylvania and Indiana, where the State regulatory agencies and the coal operators had tackled the problem on an empirical basis and had achieved some success. In brief, the committee concluded that pollution from active mines could be ameliorated by:

1. Reducing entry of water into mines

through diversion of surface streams and by sealing crevices;

2. Minimizing contact time of water with acid-forming materials in a mine;

3. Exercising greater care in disposal of gob and other refuse materials;

4. Proportioning drainage discharges from the mines with flow of water in the stream, as opposed to the common practice of pumping intermittent "slugs" of acid water; and, finally,

5. Employment of adequate closure procedures immediately following termination of mining activities.

Ladies and gentlemen, in developing these concepts, the Engineering Committee had the benefit of review and finally the unanimous endorsement of their supplication by the ORSANCO Coal Industry Advisory Committee, another illustration, in my opinion, of the willingness of industry to cooperate toward a common goal.

On the recommendation of both committees, the Commission incorporated these concepts in a control measure that was adopted by the eight States in 1960.

To expedite application of these measures, three things have happened.

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1. The Commission denied recognition of acid mine drainage as worthy of blanket exemption from regulatory control. Thus, for the first time agreement was reached by the States and the coal industry that practical means were available to ameliorate the problem. In the history of regulatory practice this is indeed a significant development.

2. The Commission then authorized its staff to conduct "curb-stone clinics" for State agency personnel to develop "know-how" in applying corrective measures under field conditions.

3. And, finally, the ORSANCO Coal Industry Advisory Committee volunteered to promote demonstration projects in the field to aid mine operators in complying with the ORSANCO directives. In addition, the coal committee is developing guides for publication by the Commission that describe how situations at various types of mines may be dealt with.

Mr. Stein and ladies and gentlemen, a movie entitled "Coal and Water" has been produced by ORSANCO which vividly illustrates the problems of acid mine drainage and the cooperative efforts of the coal industry and the

States to deal with this problem. The film will be presented at the conclusion of this statement.

While all of this represents a good start in coming to grips with drainage from active mines, the Commission is under no illusions about the problem of dealing with so-called abandoned mines. Despite conflicting opinions that have been aired before the Engineering Committee of ORSANCO, there seems to be some basis for belief that a program of sealing abandoned workings, where possible, may offer at least a partial remedy. Records disclose that during the mid-Thirties, when Federal funds were available to provide employment and men were engaged on a mine-sealing program, there was a substantial reduction in acid conditions in some streams. These seals were not maintained when the Federal work relief program was discontinued.

Although the Commission has not yet crystallized its views, I should think they might be guided by a recommendation made by the Ohio River Committee some twenty years ago. The report of this committee, appointed by the President of the United States to direct a survey of pollution conditions in the Ohio Basin and to make recommendations for its correction, concluded that the Federal Government should subsidize a program of mine sealing under direction of the Bureau of Mines. If there is any justification for calling this conference, it might be well to explore the possibilities of implementing the recommendations of the Ohio River Committee.

Why Was This Conference Called?

The reason for presenting this background is to make the record clear regarding what the eight States in the Ohio Valley have done in the abatement of pollution, notably in connection with acid mine drainage. Not only has this Commission been cognizant of the problem, but it takes great pride in what has been accomplished.

This prompts the question: Why has the Federal Government chosen to call this conference under the enforcement procedures set forth in the Federal Water Pollution Control Act? There is no lack of enforcement authority already available to the States and the interstate agency. And as the record so eloquently demonstrates, there has been no lack of action in dealing with pollution problems in the Ohio Valley.

Furthermore, if there is any reason for the Secretary of the Department of Health, Education, and Welfare to feel uninformed or dissatisfied with any aspect of the Ohio Valley program, why was this not disclosed at a regular meeting of the Commission? The Department has its own representative -- in the person of the Surgeon General of the Public Health Service -- serving as a member of this Commission. The Surgeon General or his representative has participated in ORSANCO meetings since its organization some fifteen years ago, and has had a voice in the development of the interstate program.

The Federal Government is just as much a member of the Commission, and has just as much voice, as any of the eight States in the valley.

Following the calling of this conference, Acting Secretary Ivan A. Nestingen of the Department of Health, Education, and Welfare, in a letter dated October 14, 1963, wrote as follows:

> "The purpose of the conference, as specified by Section 8 (c) (3) of the Federal Water Pollution Control Act, is to consider the occurrence of pollution of interstate waters subject to abatement under the Act; the adequacy of measures taken toward abatement of the pollution; and the nature of delays, if any, being encountered in abating pollution."

These items of consideration, insofar as they relate to waters within the Ohio Valley District, are documented in the minutes and records of ORSANCO and in annual reports prepared for the Governors of the signatory States. Such information is -- and always has been -- readily available to the Department of Health, Education, and Welfare through its own representative on the Commission.

And so, ladies and gentlemen, it is difficult to understand, therefore, why the Department has not availed itself of these well-established channels of communication and the public meetings conducted regularly by the Commission, to express its interests. The fact that the Department has chosen not to exercise its prerogatives under the interstate compact -- a course of action that is consistent with the declared policy of Congress -- is the greatest single source of confusion that enshrouds these proceedings.

It must be said further that the report on findings recently submitted to the conferees as a basis for discussion at this meeting adds little to what is already known and to what has been the subject of past review and publication by the States and ORSANCO.

Technical considerations pertaining to these findings which will be presented by the ORSANCO staff will be deferred until after the report of the Department of Health, Education, and Welfare has been submitted. I request, Mr. Chairman, that the staff have an opportunity to present these considerations at that time. Also, I wish to announce at this time that we have with us representatives of the ORSANCO industry advisory committees who are available for answering questions, if this is desirable.

And now, Mr. Chairman, on behalf of the Ohio River Valley Water Sanitation Commission, may I present the documentary, "Coal and Water"?

MR. STEIN: Well, let's see if we have any comments or questions for you now, if that is appropriate, from the conferees.

Are there any comments or questions?

(No response.)

MR. STEIN: I thank you for a very comprehensive statement. I do know we did have a pre-conference meeting, as you indicated, yesterday, and I thought it was agreed that we would come up and have ORSANCO make its presentation first -- we were perfectly willing to do that -- and that the conferees would ask questions. However, if you wish to modify that at this time and have your staff have an opportunity to criticize our report after we put it in, we have no objection.

MR. SHAW: Well, it was felt by the gentlemen that they would be in a better position to comment on it after you had given it.

MR. STEIN: We would be delighted to have that.

I am glad to know your wish now.

I have another comment, possibly, or, rather, a clarification possibly, and I think we very well may be rather close on the philosophy on mine sealing. I am very much heartened by your comment.

One of the problems, I think, that has occurred in attempting to get financing for mine sealers or acid mine control problems is, for some reason, that people think if you enter this kind of a problem, unless you have achieved one hundred percent success and completely eliminated acid mine drainage, that you may have thrown money down the drain.

I would submit that in ordinary sewage treatment, we generally don't get one hundred percent reduction. If you have primary treatment, you may be getting around 50 percent, and secondary somewhere between 50 and going up to 80 or 90 percent.

It would seem that if our philosophy is the same on this, that any program for controlling acid mine drainage involving sealing, which may create a substantial reduction, would be well justified, and we shouldn't necessarily have to look for 100 percent elimination right off.

MR. SHAW: It's like the old Chinese saying, "A thousand-mile journey begins with one step."

May we show the film?

MR. STEIN: Did you want to set up a screen?

MR. SHAW: I thought the screen was here, but it vanished. I see it right here (indicating).

MR. STEIN: I think you need some time to set it up. If you wish, we can get up and recess while you set up the screen. I think this will take a few minutes.

MR. SHAW: I have a final paragraph to read of the statement after the film.

MR. STEIN: We would be happy to hear it.

(Whereupon a recess was had. Then the film entitled "Coal and Water" was shown.)

MR. STEIN: Thank you very much, Mr. Shaw, for that excellent film.

The film will be made part of the record of these proceedings, and has been submitted for that purpose by ORSANCO. Thank you very much indeed.

Would you continue, Mr. Shaw?

MR. SHAW: Yes, Mr. Stein.

Ladies and gentlemen, I am now continuing my statement.

Believing that the conferees should be acquainted with as much information as possible, we have requested the

United States Geological Survey to appear as one of the ORSANCO participants. For many years the Commission has had a contractual relationship with the Geological Survey in the conduct of water quality investigations. Recently the Geological Survey made public some of its findings before the Jones Committee of the United States Congress. These and some additional investigations relating to mine drainage will be presented at this time by Mr. George Whetstone, District Chemist of the United States Geological Survey.

Mr. Stein, I neglected to mention before the State of New York, in the person of Dr. Meredith Thompson, would like to make a brief statement, but I am not sure whether Dr. Thompson will be able to get here today. The statement will be a very brief one.

Would it be all right if he got here tomorrow?

MR. STEIN: Yes. Any time you want to put that in that is convenient, we will be glad to receive it.

MR. SHAW: Fine.

Mr. Stein, may I now call on Mr. Whetstone of the United States Geological Survey?

MR. STEIN: Yes, you may.

MR. SHAW: Mr. Whetstone.

MR. STEIN: While Mr. Whetstone is coming up, we have one announcement.

In discussing the presentation with Dr. Wilbar, there are several people from Pennsylvania who may wish to talk other than those whom Dr. Wilbar has scheduled for today.

Dr. Wilbar has indicated that if you see him, when the presentation of all the parties is in, he would be glad to consider your making a brief statement to the conferees. For those people who have not already been scheduled by Dr. Wilbar, this would necessitate your appearing sometime tomorrow.

STATEMENT OF GEORGE W. WHETSTONE, DISTRICT CHEMIST, UNITED STATES GEOLOGICAL SURVEY

MR. WHETSTONE: My name is George Whetstone and I am District Chemist with the United States Geological Survey.

INTRODUCTION

Mr. Chairman, the Geological Survey welcomes the opportunity to present a statement of its investigations of water resources in the Monongahela River Basin. For almost a century the Geological Survey and other agencies of the Department of the Interior have been engaged in the preservation of our natural resources to insure that they will be available for their best use when needed. In pursuit of this basic conservation objective, full consideration is given to two major areas of concern: (1) development of resources as an aid to national economic development, and development of each region within the economy; and (2) well-being of the people. The well-being of all of the people is to be the overriding determinant in considering the best use of water and related land resources.

G. W. Whetstone

The coming of rain in and out of season, the onset of floods, and the rise and fall of water in the well have always been vital events. But never have we needed to know so much about them, so accurately, and so quickly. This is because never before have there been so many of us, and never before has each person demanded so many gallons of water as his share of the total supply. Our way of life is continually changing; therefore, the complex subject of water quality is viewed differently today than it was yesterday. For example, yesterday hard water was tolerated as a fact of life by the domestic water consumer. Today he wants soft water. Yesterday the average man had little recreation. Today outdoor life seems within reach of all. Fishing, boating, and swimming have made the public quite conscious of water quality.

It is no wonder then that strains on water sources are already showing up, and these stresses are certain to grow. Water problems beset us everywhere. Floods and droughts, excesses and deficiencies, water supply and pollution. It is clear that we must have increasingly better knowledge of the natural supplies that there are to work with. Progress toward getting this knowledge -- the gathering of water facts -- has been underway in the Monongahela River Basin for over a half a century.

G. W. Whetstone

Let us look at these descriptions and measurements of water in the environment, the "basic data" that are the subject of this statement. What makes them so essential, so basic, in water use and control? They are basic in providing a foundation for further investigation and work that may be of many different kinds. They are the facts and figures upon which this meeting is based.

Considerable information on the water resources of the Monongahela River Basin has been assembled through the programs of the United States Geological Survey since 1898 in partnership with the West Virginia Geological and Economic Survey, the West Virginia Department of Natural Resources, the Pennsylvania Department of Forest and Waters, the Maryland Department of Geology, Mines, and Water Resources, and the Ohio River Valley Water Sanitation Commission. These investigations are designed to provide the hydrologic information and analyses needed to guide prudent development and management of the water resources of the basin.

The products of the United States Geological Survey which contribute to the scientific physical background for water management are of three general types. These are: Topographic maps, (2) geologic maps and reports, and (3) hydrologic reports describing water as it occurs and moves within its natural environment with continually changing quantity and quality.

Topographic quadrangle maps are so widely used and are so well known that they require little description. The sanitary engineer looks to USGS quadrangle maps as the source of many physical facts concerning the size, shape, and slope of river systems. He also uses them to locate and record points of diversion of stream waters and of return of waste waters to stream channels. The status of topographic mapping in the Monongahela River Basin is shown in Figure 1 of this report.

(Figure 1 is as follows:)

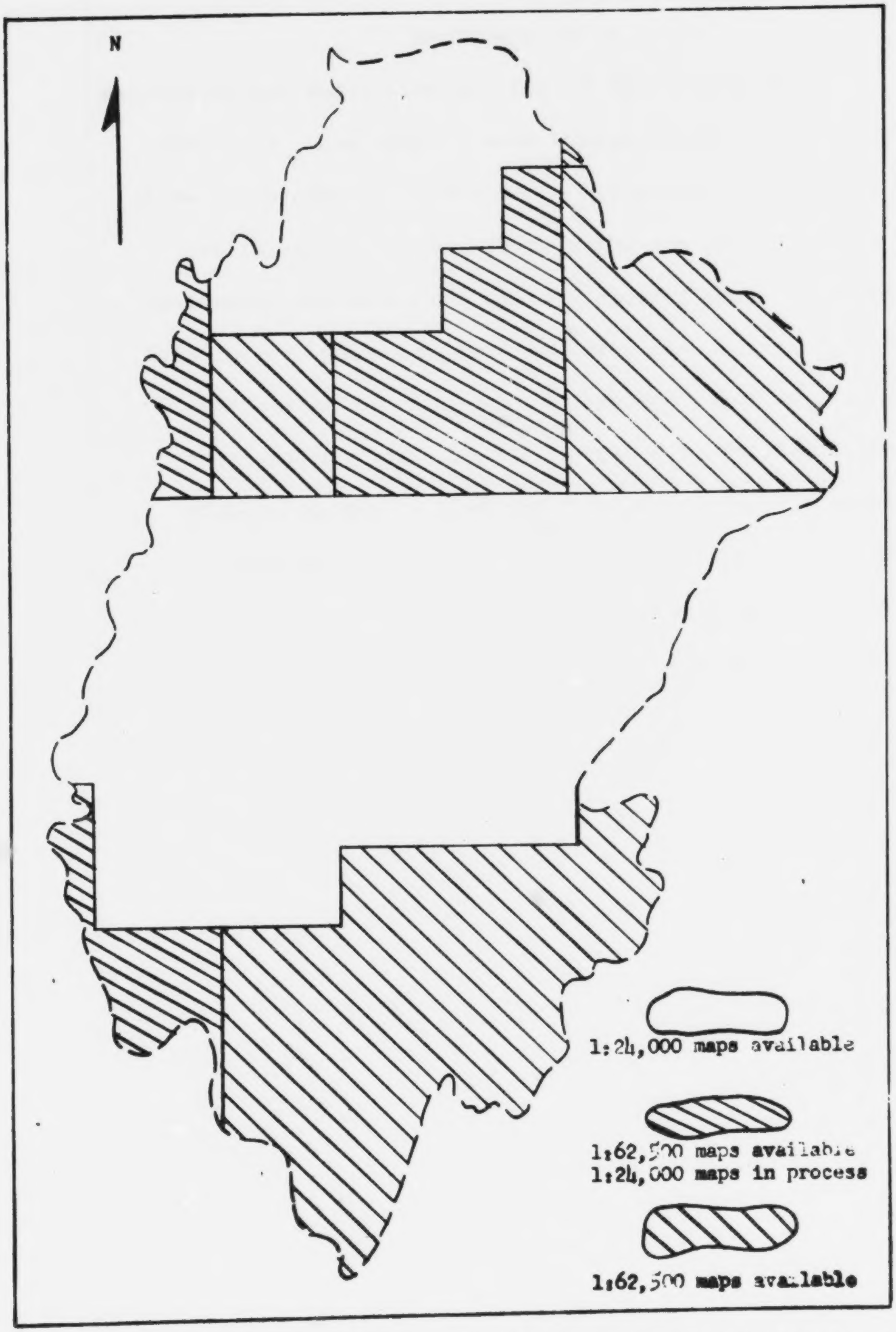

N
1:24,000 maps available
1:62,500 maps available
1:24,000 maps in process
1:62,500 maps available

Figure 1.--Availability of topographic maps in the Monongahela River basin.

G. W. Whetstone

Geologic maps reveal the rock types and structures over which the stream waters move. These maps, available for the entire Monongahela River Basin, furnish clues as to why some channels are water-tight and why others allow movement of water between streams and permeable formations, possibly carrying the chemical load including contaminants with it. Geologic quadrangle maps also facilitate the detailed mapping of bodies of groundwater and the determination of the direction of movement of any pollutants which may threaten it. A map of the general geology of the Monongahela River Basin is shown in Figure 2.

(Figure 2 is as follows:)

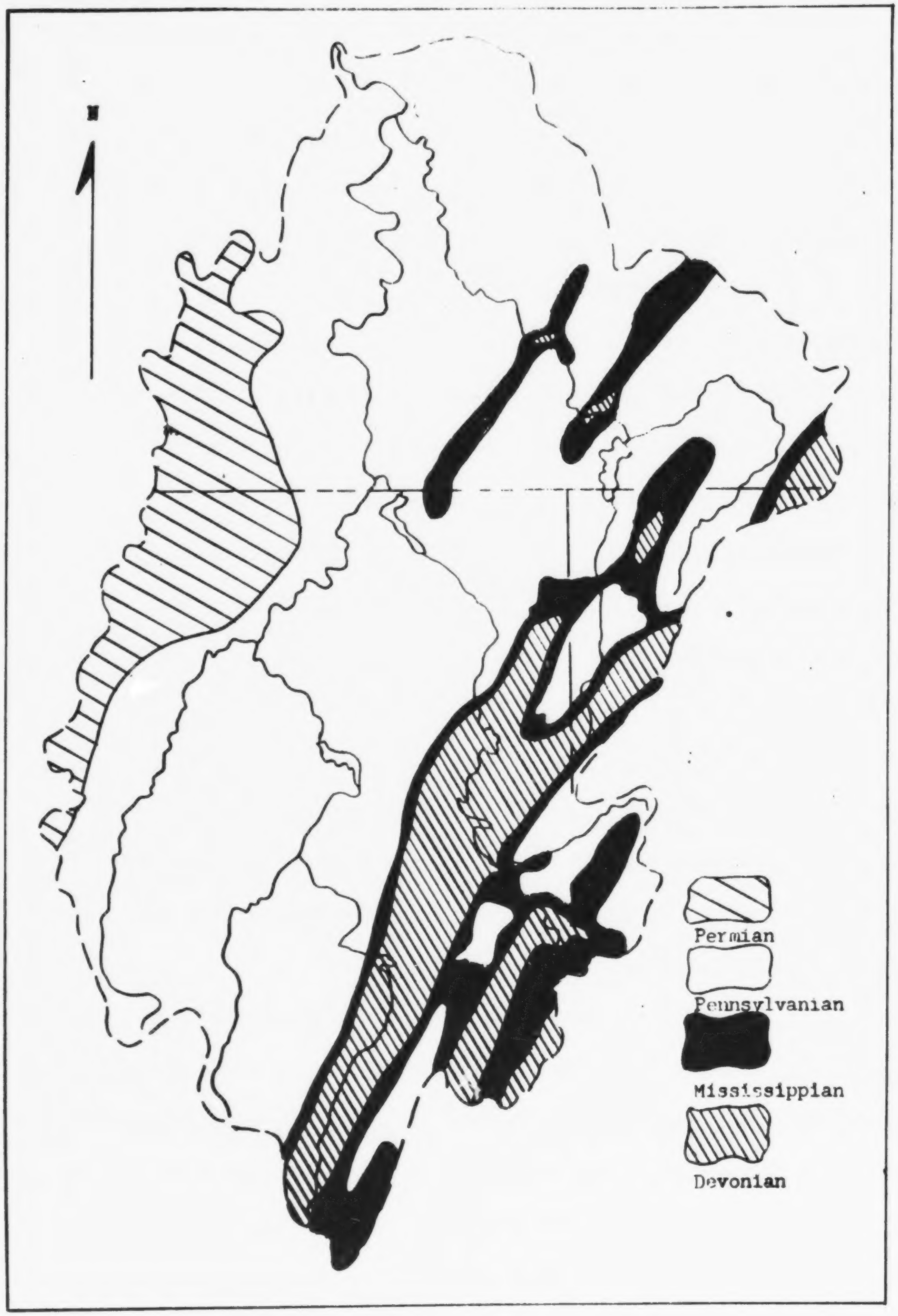

N
Permian
Pennsylvanian
Mississippian
Devonian

Figure 2.--Surficial geology of the Monongahela River basin.

G. W. Whetstone

Because they are more directly associated with the control of water-borne pollution, I will describe products of the third general type in more detail. These are the hydrologic or water resource basic data and reports.

The measurement of stream flow reveals the quantities of water available during critical periods of drought to carry off and assimilate municipal and industrial wastes. Water discharge measurements have been made at more than 250 locations in the Monongahela River Basin. Water managers are regular users of these water facts in assessing the available water supply and determining the appropriate levels of discharge of wastes into the stream system.

Stream water quality is also measured in an effort that is closely interrelated to flow determinations. This is because stream quality varies naturally with stream flow and hence is constantly changing. Both chemical and physical quality of streams are determined.

Chemical quality measurements include the most significant of the dissolved minerals picked up from the rock formations over or through which the water moves toward or in the stream channels. They also include dissolved solids from domestic and industrial wastes. Chemical quality sampling has been done through cooperative programs since 1944 and is currently being done daily and periodically at the present time at more than 90 locations on the stream system in the Monongahela River basin. It is a part of the cooperative programs to determine the industrial and public water supply utility of these waters, as well as to provide facts for pollution control studies and measures.

Water-borne sediments are now being measured on streams in the West Virginia portion of the Monongahela River Basin as part of an inventory study.

Studies of thermal loading of streams will be aided by records of temperature being collected at over 250 points on streams in the Monongahela River Basin. Stream temperatures are measured as an integral part of the hydrologic data collection program.

The natural ground water systems in the Monongahela River Basin have been better defined in recent years. The first report by the United States Geological Survey was in 1933 and covered the Pennsylvania portion of the basin. Maryland completed a study in 1954 covering the upper Youghiogheny River and West Virginia is currently cooperating with the United States Geological Survey in a basin-wide inventory program which will cover ground water problems in the basin.

To the water supply engineer, these reports show the location and magnitude of bodies of fresh ground water available for public supply. To the sanitary engineer and water manager they identify natural ground water reservoirs to be protected from pollution and indicate the manner by which contaminants move into the water supply. The reports also furnish a base for more intensive water studies when required.

Certain other features of the work patterns of the United States Geological Survey strengthen its ability to be of service to the field of water pollution control. It pursues its water resources studies with the exclusive objective of fact-finding. Its scientists are not diverted by the additional responsibilities of development, enforcement, or water management. This permits unusual attention to accuracy and scientific quality. It also helps to explain why the Survey's findings have always been accepted by both sides in any controversy over water supply or pollution.

Through its planning and other close relationships with State and local officials, the United States Geological Survey maintains intimate knowledge of water problems and other situations for which water facts are required. This permits the concentration of scientific effort and reporting to that which is timely and appropriate.

I would like to take this opportunity briefly to describe the water resource opportunities and problems that confront the water manager in the Monongahela River Basin today.

Water Assets and Water Problems of the Monongahela Basin

The overall water assets of the basin are good and in large measure are untapped. Although only a part of the rainfall is available for use, total rainfall ranges from 56 inches or more in the mountainous eastern part of the basin to 44 inches in the western part.

Outflow from the basin averages about 12,500 cubic feet per second, or about 8,100 million gallons per day at Braddock, Pennsylvania. For perspective, this is about three times the amount of water provided by the municipal and industrial supply of the Pittsburgh area. Supplies of ground water for commercial, agricultural and moderate industrial use are available in parts of the basin, and with some local exceptions, adequate domestic well supplies are generally available.

Some problems that compel the future development of the water resources of the basin are:

1. Acid mine drainage;

2. Local flooding, which makes use of lowlands bordering streams hazardous;

3. Low seasonal flow of small streams; seasonal inadequacy of some streams prohibits their use as a major source of supply;

4. Seasonal inadequacy of local shallow ground water domestic supplies; and,

5. Saline ground water at shallow depth in certain sections.

The major problem in relation to full water resource development is acid mine drainage. The Monongahela River receives more acid than it is capable of neutralizing. Based on long-term water quality and streamflow measurements, the Monongahela River carries on the average 200,000 tons of sulfuric acid per year into the Ohio River at Pittsburgh. The larger tributary streams of the Monongahela contribute only 30 percent of the mineral acidity to the mainstem.

The principal sources of the mineral acid pollution in the Monongahela River are the numerous small tributary streams in the reach between Fairmont, West Virginia, and Pittsburgh, Pennsylvania. It is in this area that attention should be directed to alleviate the acid mine drainage pollution problem.

Unfortunately, as we heard before from Chairman

Shaw and saw in the film, no single control procedure has been developed to date that can be considered a cure-all for acid mine drainage. The total elimination of acid mine drainage from the basin streams and lakes is hydrologically impossible and economically impractical. However, there are tools at hand which can be effective in reducing the effects of mine drainage on the water resource. These measures generally fall into the following categories:

(1) Minimizing the contact between water and acid-producing materials;

(2) Regulating the flow of mine waste water to the stream;

(3) Regulating the flow of the receiving streams;

(4) Neutralization; and

(5) Protecting the acid-producing materials from weathering and erosion at the end of the mining operations.

The effectiveness of all existing control procedures is predicated on a clear understanding of the natural processes involving acid formation and its transportation in the drainage system. The hydrologic and geologic characteristics in a given mining area are the fundamental factors which govern the production and disposal of mine wastes. To be effective, the controls for each mining area must be designed and employed according to these fundamentals.

Corrective measures for controlling acid mine drainage proposed by the Department of the Interior emphasize the need for a clear understanding of the natural processes involving acid formation and its transportation in the drainage system. This recognition of need for hydrologic and geologic characteristics of a given mine area as part of the solution to the problem is a necessary and clear departure from the recommendations made in the past by other groups. The Interior Department's program is also based on cooperation between the Department, the mining industry, the States, and the Interstate Compact.

The hydrologist, mining engineer, and the resource specialist must work together on this problem. The water quality problems in the basin are related to the development of other important natural resources. The maintenance of water quality involves not only the quality levels for human consumption but also water quality levels for consumption by other animal and plant life, and for industrial processes. They can be understood and managed best from the viewpoint of water as a resource, rather than from the point of a particular water quality need.

G. W. Whetstone

WATER RESOURCES

The total drainage area of the Monongahela River Basin is 7,340 square miles. The Monongahela River is formed just above Fairmont at the juncture of the Tygart Valley River and West Fork River, and it flows 128 miles north to its confluence with the Allegheny River at Pittsburgh, Pennsylvania, to form the Ohio River.

Streams of the Cheat River and Youghiogheny River Basins have steep gradients, rocky channels, and high flow velocity. Numerous sites are available for reservoirs and hydroelectric dams. Gradients of streams in the western part of the Monongahela River Basin are more gentle, channel deposits are fine grained, and the velocity of flow is more moderate. The steep dip of the rock strata in the Cheat River Basin influences movement of ground water more than in the remainder of the basin, where rock strata are nearly horizontal.

Ground Water

Studies made by the United States Geological Survey in the Monongahela River Basin indicate the availability of ground water is quite variable. Appendix A, a selected listing of some of the higher capacity wells in the basin in West Virginia, shows that supplies adequate for commercial, agricultural and moderately large industrial use are available in parts of the basin. Yields range from 30 to several hundred gallons per minute. A yield of 3 to 4 gallons per minute is required for a satisfactory domestic supply. Yields of about 50 gpm or more generally are needed for public supply or industrial supply. Location of selected observation wells is shown on Figure 3.

(Figure 3 is as follows:)

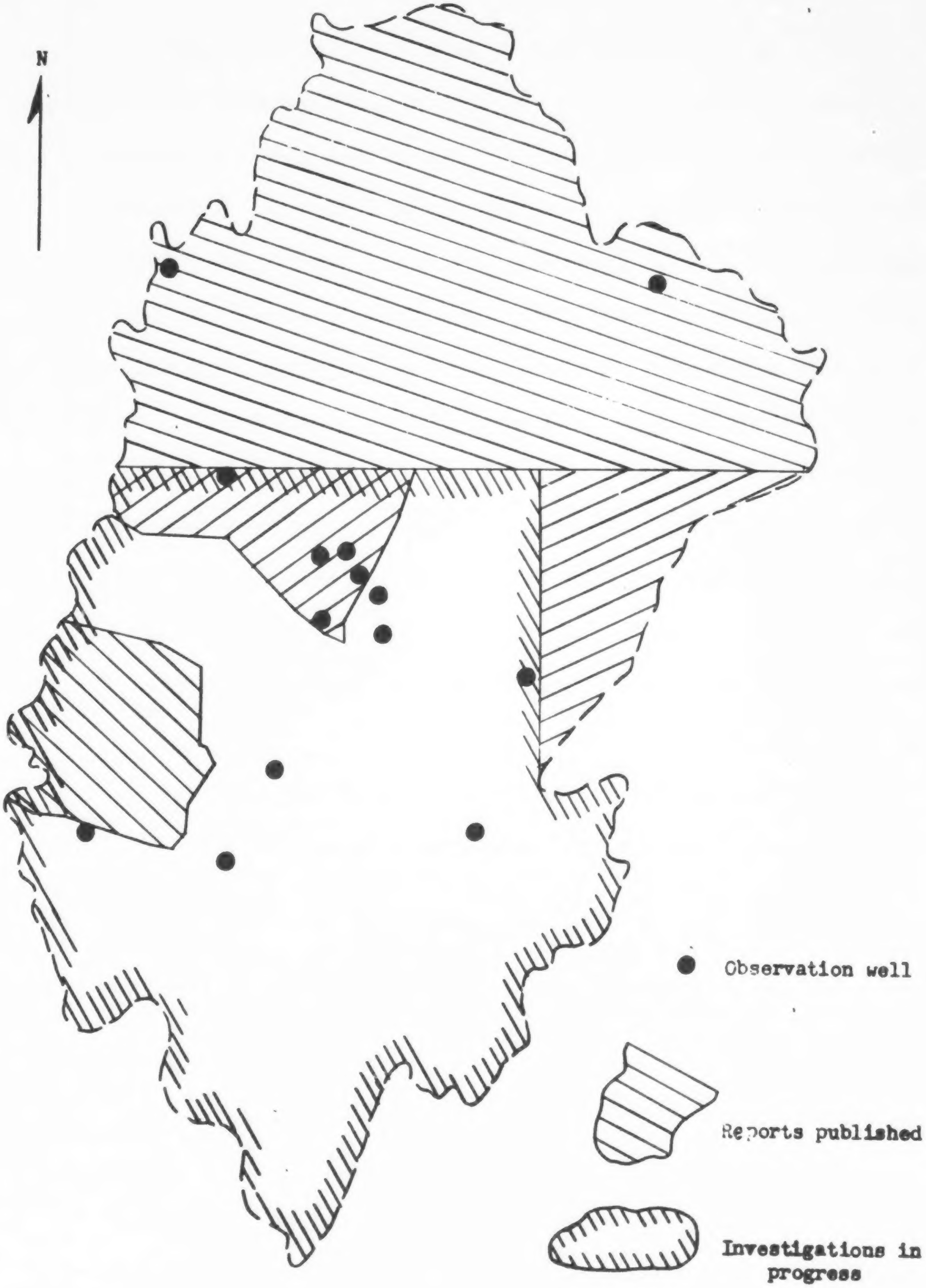

N
Observation well
Reports published
Investigations in progress

Figure 3.--Ground-water investigations in the Monongahela River basin.

Many parts of the basin have not been tested for large ground water supplies. Records are available in these areas for domestic wells only, which generally do not indicate the water-bearing potential satisfactorily. Although adequate domestic supplies are available nearly everywhere in the basin, even these small requirements may not be met in a few localities. One such locality is the Stewartstown-Canyon area in Monongalia County. Here the probable causes of the deficiency are the inherent poor permeability of the shallow rocks and possible dewatering of the shallow rocks by coal mining. However, in most such areas of poor shallow supply, the deeper rock formations -- those below 200-300 feet -- generally have not been tested for water-bearing capacity.

Generally, the low income residents of these areas makes it financially impractical to drill to the deeper aquifers.

Rock structure plays a major role in the occurrence of ground water in the basin. For example, the Chestnut Ridge anticline, which borders Monongalia County on the east, may be the intake area for some of the rock formations that underlie the basin. Apparently hydrostatic pressure provided by ground water stored in the outcrops of formations at high elevations on Chestnut Ridge has flushed much of the fossil saline water from the rocks that underlie eastern Monongalia County, and in the remainder of the basin may have diluted the saline waters. The Pottsville Group, a major aquifer, contains water with less than 200 ppm of chloride in the eastern part of the basin and less than 1,000 ppm throughout much of the remainder of the basin.

The structural attitude of the rocks, a profile of the piezometric surface, and the distribution of fresh and saline ground water in the Pottsville Group are shown diagrammatically in Figure 4.

(Figure 4 is as follows:)

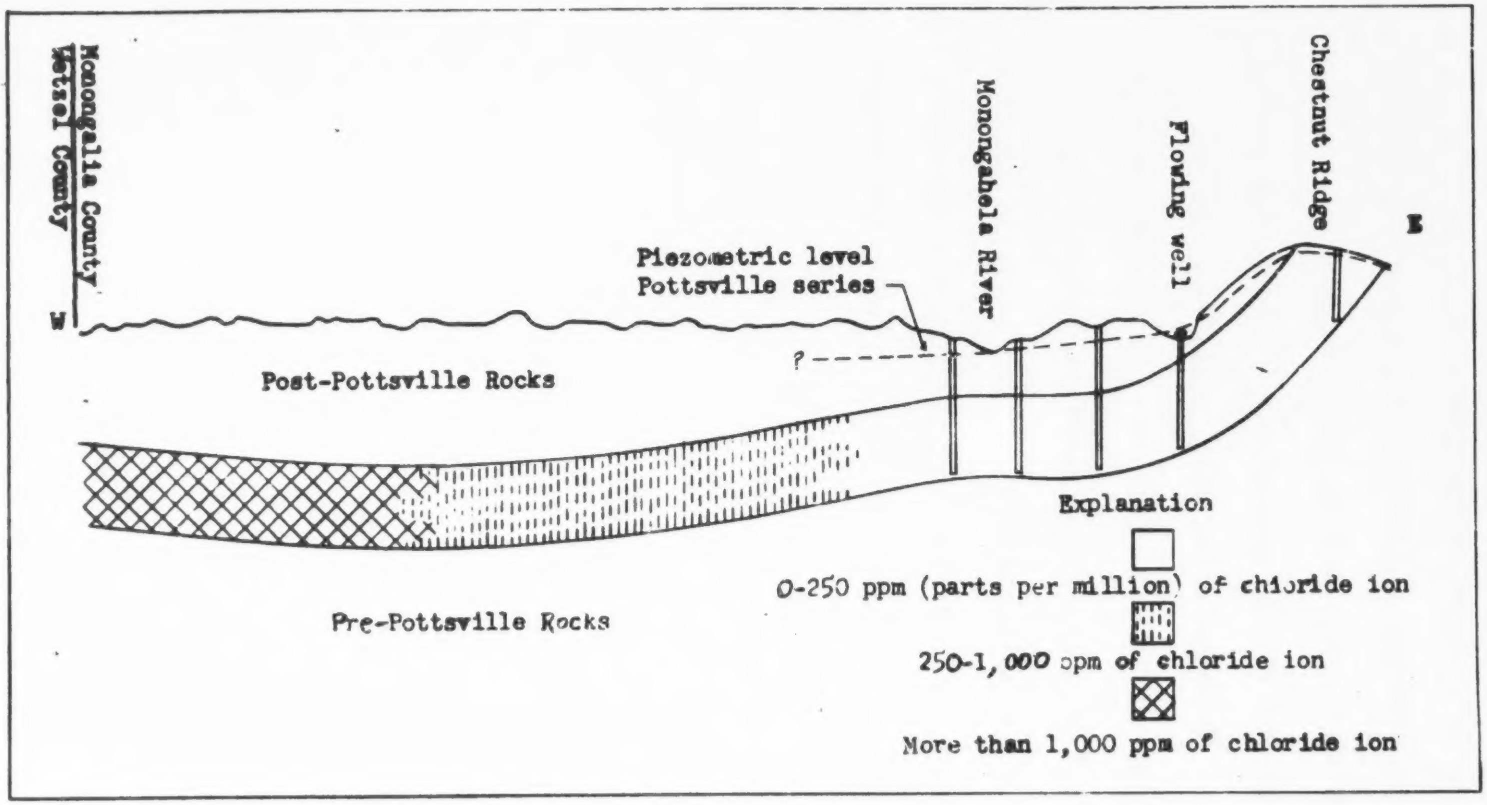

Monongalia County
Wetzel County
W
Piezometric level
Pottsville series
Monongahela River
Flowing well
Chestnut Ridge
E
?
Post-Pottsville Rocks
Pre-Pottsville Rocks
Explanation
0-250 ppm (parts per million) of chloride ion
250-1,000 ppm of chloride ion
More than 1,000 ppm of chloride ion

Figure 4.--Diagrammatic E-W cross section showing distribution of fresh and saline ground water in Pottsville Group in Monongalia County, W. Va.

Some of the fresh water entering the Pottsville rocks in the outcrop area probably percolates laterally to adjacent formations or is discharged as springs along the west slope of Chestnut Ridge. In the vicinity of Morgantown, ground water is discharged to overlying formations, and, eventually, to the Monongahela River. A part of the water in the Pottsville Group probably continues down the dip to the western part of Monongalia County and counties to the west of it. Possibly, tongues of fresh and saline water interfinger. The principal water-bearing sands -- the Homewood and Connoquenessing Sandstones -- may allow greater western advance of the fresh water than the less permeable shaly members of the Pottsville Group.

Chemical Quality of Ground Water

Coal-bearing rocks characterize the lithology of mush of the Monongahela River Basin, but the coal itself may have little overall effect on the chemical character of the ground water. Quality of the ground water is discussed here by geologic units.

The Chemung Formation of Devonian age is the oldest rock unit in the Monongahela River Basin for which an analysis of ground water is available. Measurements made by the Geological Survey on samples collected from the municipal well at Rowlesburg, Preston County, West Virginia, shows the water to be hard (131 ppm) and to have a moderate chloride concentration (237 ppm).

Water from the Pocono Formation of Mississippian age contains high iron concentrations. The uppermost member of this formation, the Big Injun Sandstone, yields fresh water in all wells sampled east of Morgantown, Monongalia County. This sandstone probably contains fresh water throughout most of the northeastern part of the basin. West of Morgantown, the Big Injun contains concentrated brine. Hardness of the Big Injun fresh water ranges from 34 ppm to 120 ppm. The few available records indicate that the underlying Squaw Sandstone contains saline water.

The Pottsville Group of Pennsylvanian age is of actual and potential importance as an industrial aquifer and yields fresh water of excellent quality throughout most of the eastern half of the basin; but the water becomes progressively saline westward (Figure 4). Mineralization of fresh water is generally low. Hardness ranges from 8 to 105 ppm (median, 24 ppm). The median sulfate content is also low (4.5 ppm). The total iron concentration is commonly high, the highest amount being 14 ppm. Ground water from the overlying Allegheny Group generally has low mineralization, the highest dissolved solids content being 233 ppm. Hardness ranges from 22 ppm to 221 ppm (median, 80 ppm).

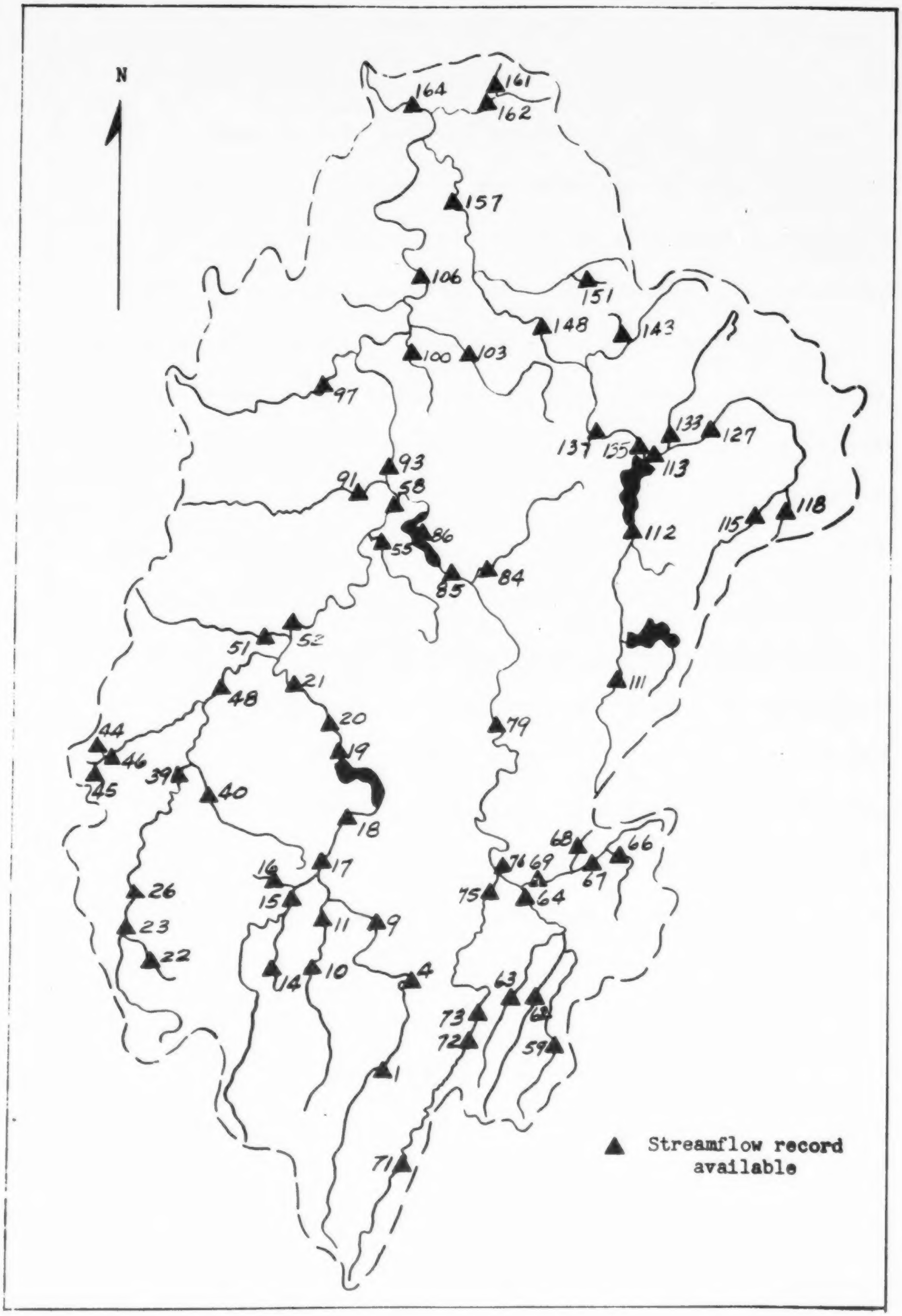
Water in the Conemaugh Group, as well as in the overlying Monongahela and Dunkard Groups, contains higher dissolved solids and hardness concentrations than do the underlying formations. The range of hardness in Conemaugh water is from 4 ppm to 765 ppm (median, 96 ppm). The median sulfate value is 22 ppm. Many wells tapping the Conemaugh Group in Harrison County, West Virginia, show high chloride concentrations. The Monongahela Group, in common with the underlying Conemaugh Group and overlying Dunkard Group, shows a great diversity of water types. However, both sulfate and hardness concentrations are higher in the Monongahela Group than in the others, reflecting the greater importance of the Monongahela Group as a coal-bearing unit. The range of hardness is from 12 to 1,210 ppm, with a median of 173 ppm. The median sulfate concentration is 50 ppm.

In the Blacksville area and some other locations in western Monongalia County, water in the Dunkard Group of Permian age is contaminated with brine. At least part of this occurrence of saline water at shallow depth is related to oil development. In some places, chloride concentrations exceed 1,000 ppm. Hardness in these areas ranges from 4.5 ppm to 720 ppm, with a median of 95 ppm and the median sulfate concentration is 12 ppm.

Surface Water

Studies of hydrology and prudent water development and water management require knowledge of the day-to-day flow of streams. Maximum, minimum and average streamflow at the gauging sites within the basin are given in Appendix B. As shown in Figure 5, streamflow in the basin is measured continuously at a large number of stream stations maintained by the United States Geological Survey in cooperation with the States and the United States Corps of Engineers. The stations in Appendix B can be located on Figure 5 by the map numbers.

(Figure 5 is as follows:)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▲ Streamflow record available

Figure 5.--Stream gaging stations in the Monongahela River basin.

Although the availability of surface water in all the uncontrolled tributary streams of the basin fluctuates over a wide range as a result of rapid runoff, most have unlike flow characteristics depending on the precipitation, topography, and other physical characteristics.

Owing to greater precipitation and steeper slopes, the runoff per square mile in the Cheat River Basin (2.22 cfs per sq. mi.) is greater than that of the main stem of the Monongahela River (1.66 cfs per sq. mi.) Variability characterizes the flow in both basins, and without storage and flow controls, such as that provided by the Tygart River Reservoir and the Monongahela River navigation dams, streamflow may be deficient during the summer and fall and excessive during other seasons. The effect of Tygart River Reservoir on the availability of water is readily apparent by comparing the station at Philippi, which is above the dam, to the station at Colfax, which is just below the dam. Water available at least 90 percent of the time at Philippi equals .099 cfs per sq. mi., whereas at Colfax it equals .318 cfs per sq. mi. of drainage area.

The discharge of the Monongahela River at Lock 15, at Hoult, West Virginia, below the confluence of the Tygart Valley and West Fork Rivers, has averaged 4,128 cfs (unadjusted for storage), based on 25 years of record

(1938-62). The maximum discharge observed was 91,500 cfs on January 2, 1919, and the minimum daily discharge was 33 cfs on September 27 and October 2, 1917. The minimum daily discharge since the completion of Grafton Dam on the Tygart Valley River in 1938 was 195 cfs on January 27, 1940. The average annual discharge of the major streams in the Monongahela River Basin is shown in Figure 6.

(Figure 6 is as follows:)

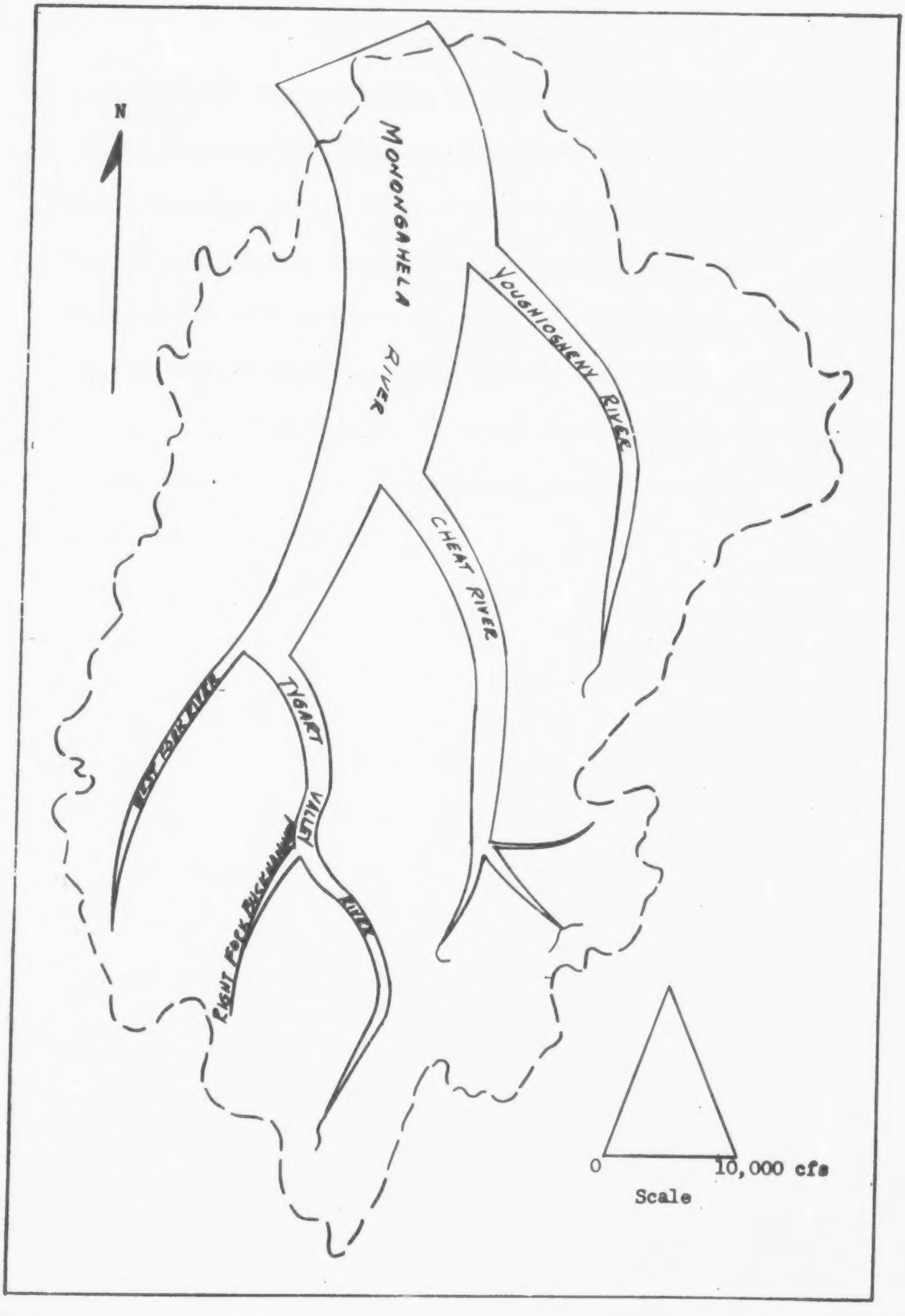

N
MONONGAHELA RIVER
YOUGHIOGHENY RIVER
CHEAT RIVER
TYGART VALLEY RIVER
WEST FORK RIVER
RIGHT FORK BUCKHANNON
0
10,000 cfs
Scale

Figure 6.--Average water discharge of major streams in the Monongahela River basin.

Floods

The largest floods in the Monongahela River Basin in West Virginia that occurred during the period of record at gauging stations throughout the basin are listed in Appendix B. Information is included on other floods which occurred prior to the period of record. These locations are at or near gauging stations which are presently in operation.

MINE DRAINAGE PROBLEM IN MONONGAHELA RIVER BASIN

Mining operations necessary to remove coal or other mineral resources alter the hydrologic environment in a mining area. The two primary changes in the environment are: (1) Exposure of unweathered rocks containing pyrite to water in both oxygenated and anaerobic environments; and (2) modifications of the surface and underground drainage pattern. These changes are responsible for the formation of large quantities of acid water which reach natural drainage systems through rock fractures or mine openings.

Chemical Character of Mine Water

G. W. Whetstone

Many bituminous mines in the Appalachian coal belt, including those in the tri-State area of northern West Virginia, southwestern Pennsylvania, and western Maryland, discharge acid water containing dissolved iron compounds. In addition to the engineering problems it creates within the mine, acid mine water, when discharged to streams, generally increases the acidity, total solids, sulfate, iron, and hardness, and greatly impairs the utility of the receiving stream. The increase in the acid content of the water can be attributed principally to the pyrite and marcasite (iron disulfide minerals) associated with the coal and adjacent strata. These minerals oxidize to form sulfuric acid and ferrous sulfate.

The mineral character of water may change appreciably upon passing through the "acid-forming" materials in mines characteristic of the tri-State area. Typical acid mine water has a high iron and sulfate content. Mining sets the scene for accelerated acid formation and, after mining ceases, the acid formation generally continues. Prompt removal of water seeping into a mine inhibits the formation of acid. Worked out areas in which the roof strata have fallen are a prime source of mine acid. In the conventional room and pillar mining, the roof strata remain intact during development and are unable to furnish important quantities of acid. As pillar removal starts, in the final stage of the mining operation, the roof strata fall to the floor of the mine. These loose masses of broken roof shale, clay, coal, and perhaps sandstone from above the roof, are exposed to the action of air and moisture and acid is formed. In addition, overlying strata may crack, facilitating the entrance of ground water and surface water to the mine. The formation and discharge of acid water may continue for many years after a mine has been abandoned.

Modern earthmoving equipment has made possible an upsurge of activity in the strip mining of coal in the tri-State area. Mining by this method can drastically disturb the face of the land. Spoil banks resulting from strip mining operations are generally composed of a heterogeneous mixture of sandstone, siltstone, claystone, soil, and water-soluble sulfur compounds. Surface and ground water passing over or through this material removes the products of chemical weathering and transports them to surface or ground water drainage systems. Like water from underground mines, drainage from spoil piles contains dissolved iron compounds and is generally acid.

Effects of Mining on The Hydrology

G. W. Whetstone

Mining of the extensive coal beds in the Monongahela Basin generally has disrupted the natural cycle of water occurrence and has been detrimental to the quality of the water. Ground water is the source of drainage water from underground mines. Surface and ground water are sources of drainage from strip and auger mines. Natural ground water gradients and ground water storage are greatly altered by mining activity. Removal of supporting pillars or blasting in a mine may permit the overlying rocks to sag and fracture. These fractures commonly extend to the land surface and facilitate the entrance of water. The large underground voids created by mining increase the storage capacity of the rocks and their ability to transmit water. In most coal mines, gravity drainage and pumping are necessary to some degree in the operations and large volumes of rock are dewatered. Pumpage from nine mines in the northern West Virginia (all developed in the Monongahela Group) ranged from 0.004 mgd to 0.3 mgd per mine; the average was 0.1 mgd per mine.

Changes in the structure and hydrologic characteristics of the strata in a mining area and variations in volume of mine drainage, along with variations of stream flow, demand a full understanding of the hydrology of an area as the first step in pollution abatement.

G. W. Whetstone

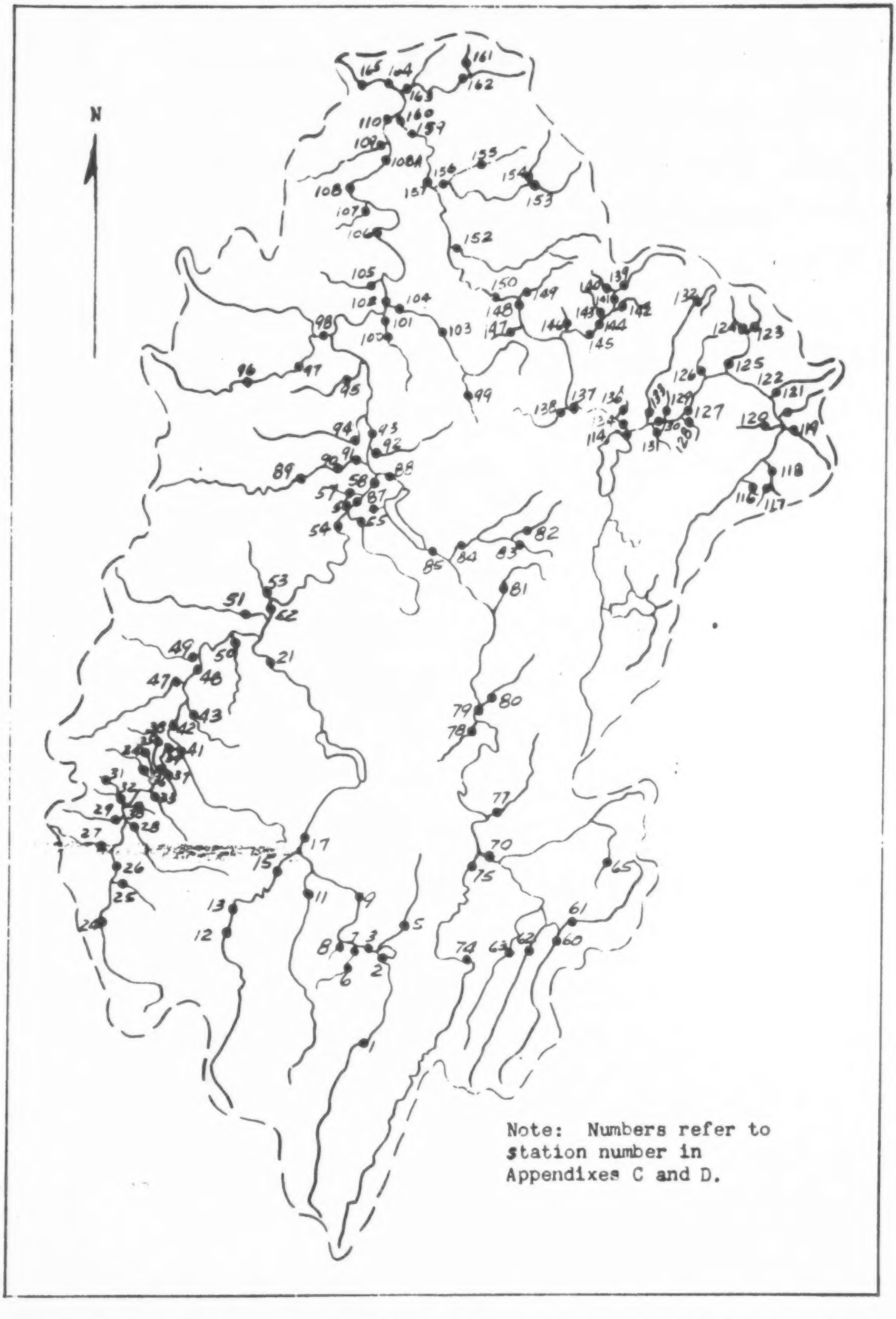
Effects of Mine Drainage on The Water Resource

Nature has provided a means for streams to assimilate small quantities of acid produced by the natural weathering of earth materials. Most natural streams in the United States tend to be alkaline because of the extensive beds of limestone and other alkaline rocks and soils with which the water comes in contact. The United States Geological Survey has found that most mine waste waters contain from ten to several hundred times as much dissolved mineral matter and suspended sediment as natural waters in the same area. Dissolved constituents, principally sulfates, iron, manganese, aluminum, calcium, magnesium and silicates are present in most mine discharges. As the acid-laden mine water enters an alkaline stream, at least part of the acid load is assimilated and the pollution problem is partly alleviated. As the water moves downstream and sufficient quantities of additional fresh water are contributed by tributaries, a point is eventually reached where the acid load is completely assimilated and the stream remains alkaline. Unfortunately, many streams in coal fields are in contact only with sandstone, shale and coal and reactions with these materials result in weakly alkaline water with limited neutralization capacity. Small amounts of acid wastes will seriously affect these streams. Thus, even though there is dilution of the acid waters by streams in the coal fields, neutralization does not occur until tributaries from limestone areas enter the acidic stream.

This condition of insufficient alkaline water exists in the Monongahela River Basin of Maryland, West Virginia, and Pennsylvania. The Monongahela's tributaries contribute more acid to the river than it is capable of neutralizing. The Monongahela River is an acid stream and, in fact, carries on the average the equivalent of 200,000 tons of sulfuric acid per year into the Ohio River (See Figure 11).

The total residual mineral acid load of the Monongahela River at Braddock, Pennsylvania, comes from the unneutralized acid discharges received from tributary streams. The principal problem areas within the basin are identified in the following sections. The data presented are based on long-term studies made by the United States Geological Survey. A summary of water quality data for the basin is given in Appendices C and D and the locations are shown in Figure 7.

(Figure 7 is as follows:)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Note: Numbers refer to station number in Appendixes C and D.

Figure 7.--Chemical quality sampling stations in the Monongahela River basin.

G. W. Whetstone

Water from the Tygart Valley River upstream from and at Elkins, West Virginia, is a soft, calcium bicarbonate type with low mineralization (Figure 8.)

(Figure 8 is as follows:)

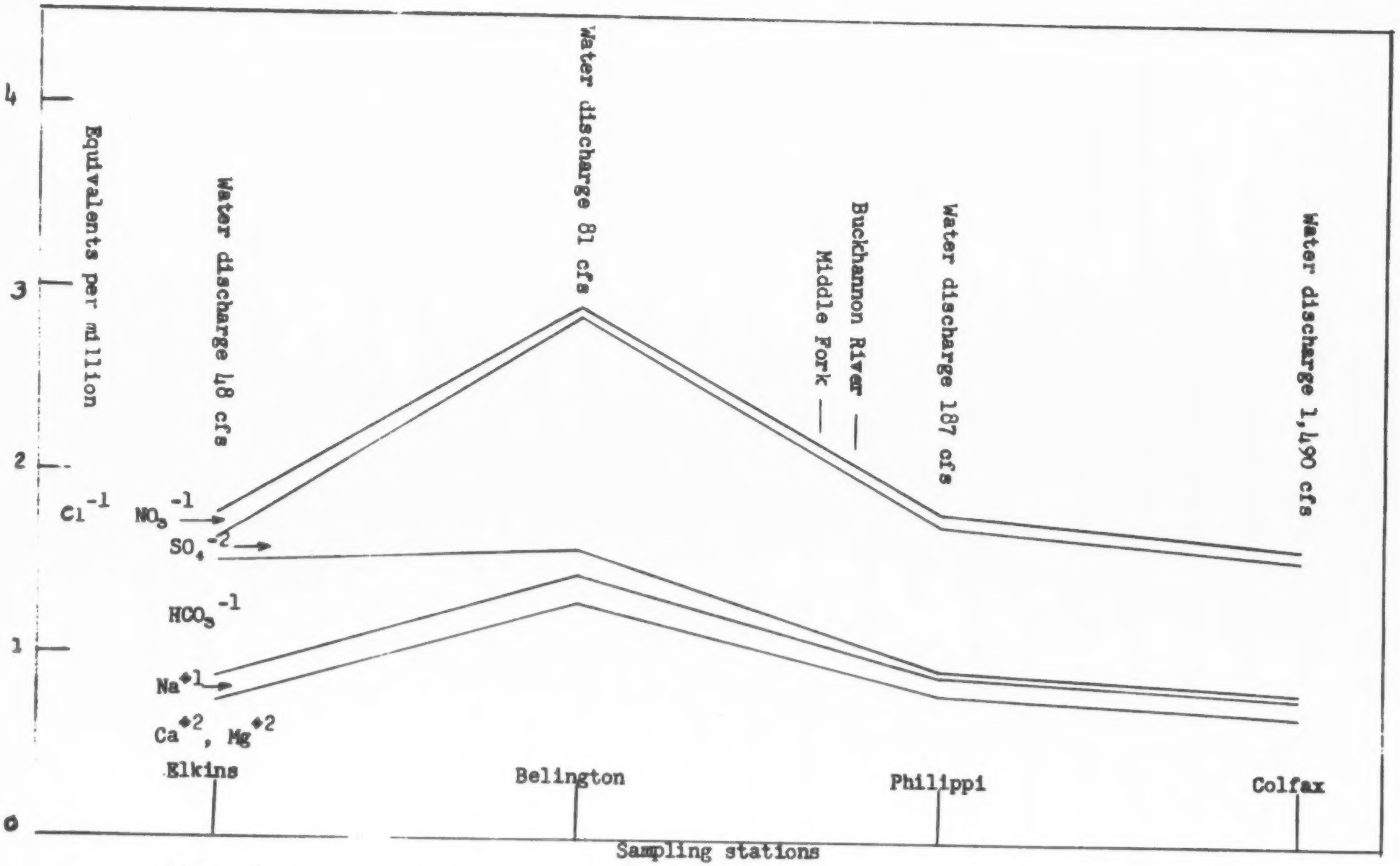


Figure 8.--Chemical composition of dissolved solids, Tygart Valley River, September 1960.

Roaring Creek and Grassy Run contribute acid drainage to the Tygart Valley River and reduce the alkalinity of the water to dangerously low levels at Belington, West Virginia. The increase in sulfate content changes the water to a calcium sulfate type. Hardness increased from 30-40 ppm to the 50-60 ppm level and is principally non-carbonate hardness.

The very soft, slightly mineralized (20-40 ppm) waters of the Middle Fork and Buckhannon Rivers dilute the Tygart Valley River below Belington. At Philippi, West Virginia, the water is softer and less mineralized than at Belington, but is still of the calcium sulfate type. The chemical character of the water at Colfax, West Virginia, below the Tygart Reservoir, is similar to that at Philippi. At Colfax the acid load has been almost entirely assimilated by the Tygart Valley River, so the river contributes an average of only 6,000 tons per year of equivalent sulfuric acid to the Monongahela River. Most of this load is contributed during a few days each year.

West Fork River is more mineralized than any other major stream in the Monongahela River Basin (Figure 9).

(Figure 9 is as follows:)

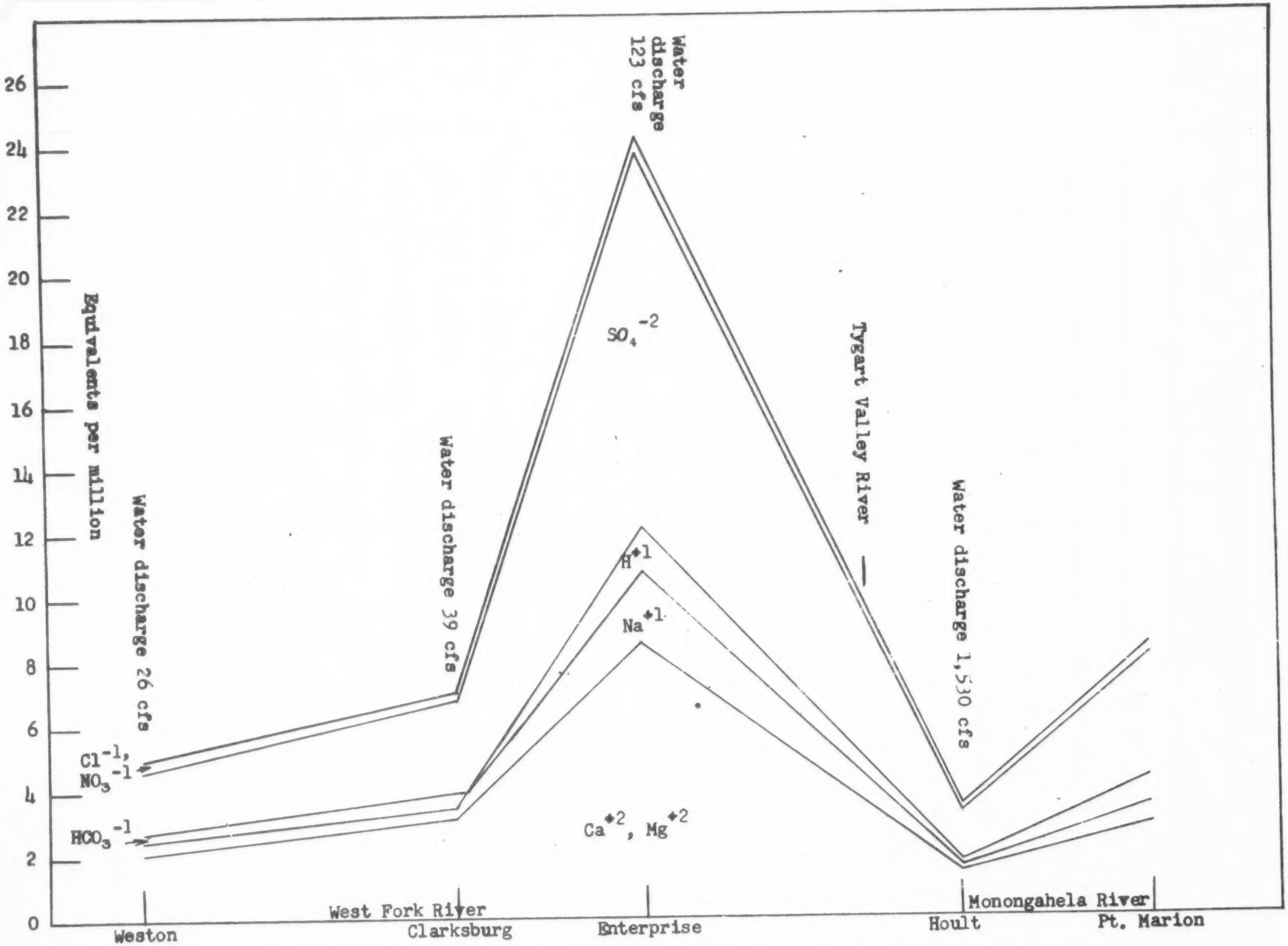


Figure 9.--Chemical composition of dissolved solids, West Fork River and Monongahela River, September 1960.

Even in the upper basin near Weston, West Virginia, the water quality measurements indicate higher mineralization (100-1,200 ppm) than is present in most other headwater streams in the Monongahela Basin. West Fork River is moderately hard to very hard (75-200 ppm) and of the calcium sulfate type. Moving downstream from Weston, the chemical quality deteriorates as mine drainage is contributed by Lost Creek and Browns Creek. Further deterioration is quite noticeable between Clarksburg and Enterprise as Elk, Simpson and Tenmile Creeks contribute additional acid water to the river. Concentrations of iron, manganese, sulfate, and hardness increase and the pH values and alkalinity decrease. These acid discharges are in excess of the neutralizing potential of West Fork River and result in an acid load of 40,000 tons per year at Enterprise, West Virginia.

The Monongahela River is formed by the confluence of the West Fork and Tygart Valley Rivers. Most of the water is contributed by the Tygart Valley River, which dilutes the acidity contributed by the West Fork River. At Hoult, West Virginia, the Monongahela River carries an acid load of 45,000 tons per year, is a calcium sulfate type, is moderately hard to hard (60-200 ppm), and carries large amounts of aluminum, iron and manganese in solution. Downstream from Hoult, additional acid water is contributed by small tributary streams such as Deckers Creek and Scotts Run. At Point Marion, Pennsylvania, the Monongahela River is more highly mineralized (100-620 ppm) than at Hoult and the acid load has increased to 80,000 tons per year. The concentration of mineral acidity, as measured over the period 1952-62, ranged from 5 to 80 ppm as H_2SO_4.

The Cheat River enters the Monongahela River below Point Marion, Pennsylvania. The Cheat River discharges only a negligible mineral acid load to the Monongahela River. However, the water in the Cheat River is soft; the dissolved-solids content is generally less than 60 ppm with calcium and sulfate the predominant constituents.

Because of the low alkalinity, the Cheat River has a low neutralization capacity. This stream cannot always assimilate the acidity contributed by tributaries such as Muddy, Beaver, and Canyon Creeks, and, therefore, the water in the Cheat below Rowlesburg, West Virginia, becomes acid. However, the buffering capacity of the natural water probably would limit the use of this stream for extensive sport-fishing use even if the acid discharges were not present.

The Casselman River is a main tributary to the upper Youghiogheny River. At Harnedsville, Pennsylvania, the Casselman River sometimes contains sulfate in excess of 100 ppm and commonly has a pH of less than 4.5. Below Harnedsville, some tributaries to the Casselman River contain concentrations of bicarbonate in excess of 25 ppm, which neutralize a portion of the acid load. The Casselman River contributes an average of about 22 ppm of mineral acidity to the Youghiogheny River at Confluence, Pennsylvania.

The pH of the Youghiogheny River upstream from Confluence generally exceeds 5.5, and calcium sulfate ions are the principal constituents. The acidity of the Casselman River lowers the pH of the Youghiogheny River at Confluence, Pennsylvania. The tributaries to the Youghiogheny River downstream from Confluence, however, contain appreciable amounts of calcium and bicarbonate ions and raise the pH of the Youghiogheny River above 5.5. Downstream from Connellsville, Pennsylvania, acid mine drainage from tributaries such as Sewickley Creek lowers the pH of the Youghiogheny River and increases the sulfate content. The Youghiogheny River at Sutersville, Pennsylvania, is generally acid; the pH exceeds 5.7 less than 10 percent of the time. The Youghiogheny River contributes an average of 12,000 tons of acid per year to the Monongahela River at McKeesport, Pennsylvania.

During the greater part of the year, the Monongahela River as it enters Pennsylvania from West

Virginia, at Point Marion, Pennsylvania, has a pH of less than 4.5. Most of the western tributaries to the Monongahela River downstream from Point Marion have large sulfate concentrations, but they are not acid and generally have pH values greater than 5.5. Two exceptions are Dunkard Creek and Peters Creek, which are often acid. Several of the eastern tributaries to the Monongahela River have mineral acidity and contain sulfate concentrations in excess of 300 ppm. The general changes in the chemical composition of the Monongahela River from Point Marion to Pittsburgh are shown in Figure 10.

(Figure 10 is as follows:)

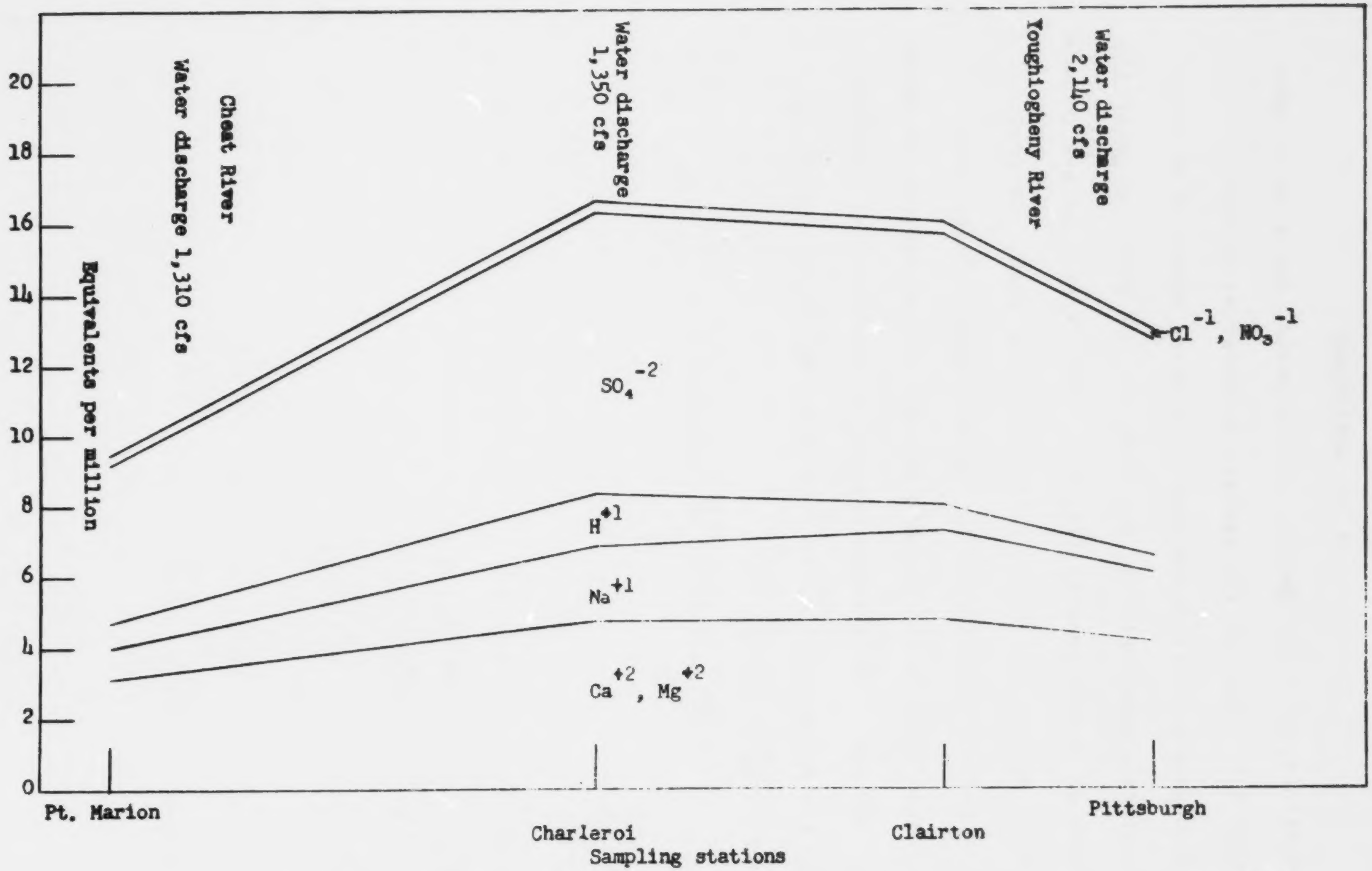


Figure 10.--Chemical composition of dissolved solids, Lower Monongahela River, September 1959.

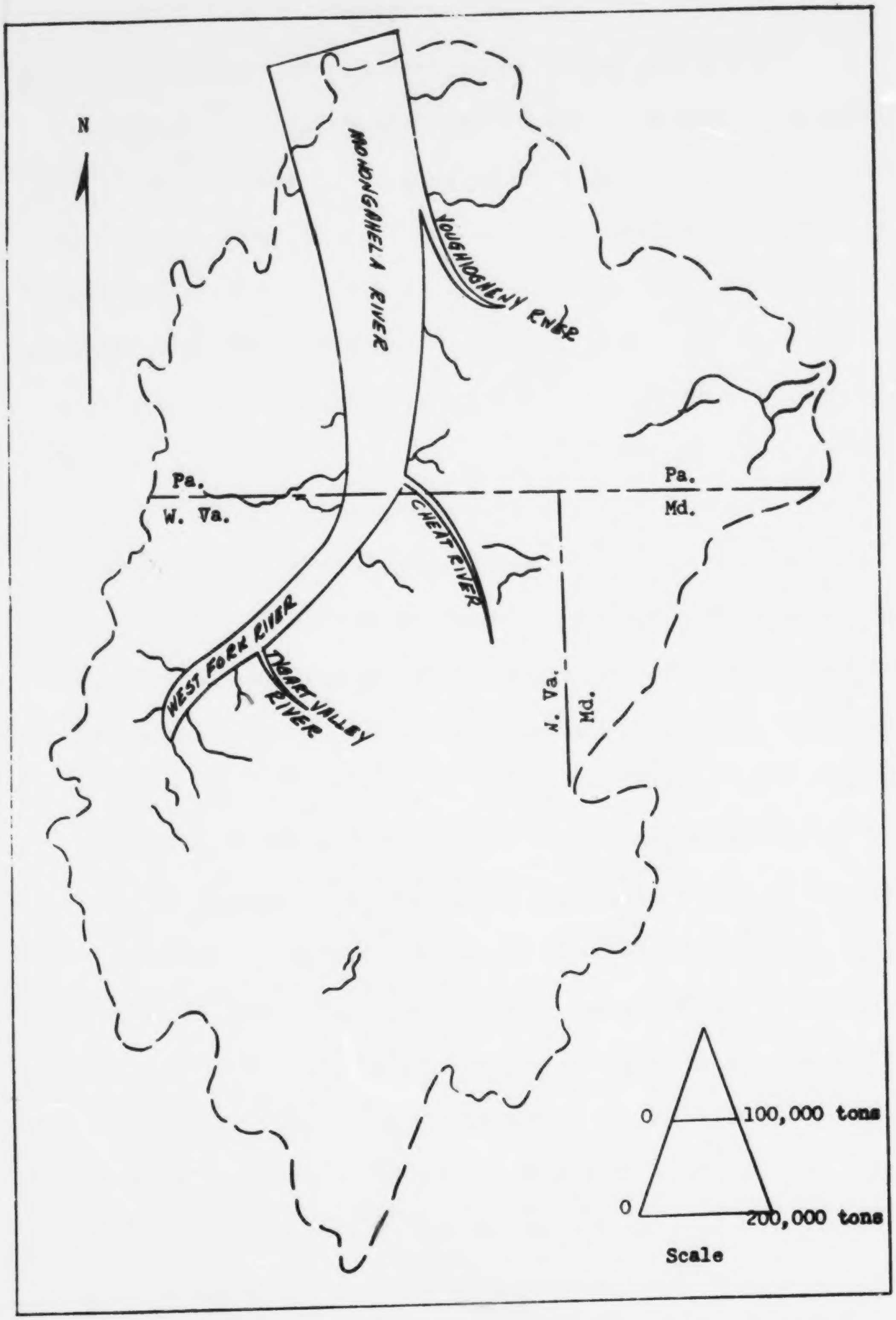
G. W. Whetstone

At Charleroi, Pennsylvania, and downstream to its mouth at Pittsburgh, the Monongahela River is a moderately hard to hard, calcium sulfate type water and commonly contains mineral acidity. The acidity of the water varies between 0 and 127 ppm expressed as H_2SO_4 and averages about 25 ppm. At Charleroi, the pH of the water equals or exceeds 4.9 only 10 percent of the time and the acid load averages 150,000 tons per year.

Between Charleroi and Braddock, Pennsylvania, the mineral acid load of the Monongahela River increases to 200,000 tons per year. About 12,000 tons of this increase come from the Youghiogheny River and the remainder from numerous small streams tributary to the Monongahela River.

In summary, the significant areas of acid discharges in the Monongahela River Basin are along the mainstem of the river between Fairmont, West Virginia, and Braddock, Pennsylvania. The principal tributary streams of the Monongahela River contribute only 30 percent of the mineral acidity to the mainstem (Figure 11). The major acid mine drainage problems in the basin are in the small streams tributary to the mainstem. The bulk of the residual mineral acidity in the Monongahela River is received from this source.

(Figure 11 is as follows:)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MONONGAHELA RIVER
YOUGHIOGHENY RIVER
Pa.
W. Va.
Pa.
Md.
CHEAT RIVER
WEST FORK RIVER
TYGART VALLEY RIVER
W. Va.
Md.
0
100,000 tons
0
200,000 tons
Scale

Figure 11.--Average annual mineral acid loads of streams in the Monongahela River basin.

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APPENDIX A

Wells in the Monongahela River Basin

Wells in the Monongahela River basin in West Virginia yielding 200 gallons per minute or more.

Well number	Use	Depth (feet)	Yield (gpm)	Specific capacity (gpm per ft. of drawdown)	Water-bearing geologic formation
			Monongalia County		
9-5-20	Not in use	820	125	--	Pottsville Group
9-5-99	Industrial	150	400	--	Conemaugh Group
9-6-3	do	540	400-500	--	Pottsville Group
9-6-19	do	595	100	2.9	do
9-6-20	do	360	25-50	--	do
9-6-24	Not in use	220	75	--	Conemaugh and Allegheny Groups
9-6-25	do	100	50	--	Conemaugh Group
9-6-33	Industrial	600	250	7.0 (5 day test)	Pottsville Group
9-6-34	do	600	110	--	do
9-6-35	do	597	250	14 (2 day test)	do
9-6-44	do	105	120	5.8 (3 hr. test)	Pocono Formation
			Preston County		
11-3-1	do	138	150	50 (2 hr. test)	Allegheny Group
11-3-2	do	128	300	100 (2 hr. test)	Pottsville Group
11-3-4	Public supply	73	100	--	Allegheny Group
11-3-5	do	118	100	--	do
11-3-6	do	203	55-60	--	Pottsville Group
11-3-10	Industrial	3,200	350	--	--
11-5-5	Public supply	119	50	--	Allegheny Group
11-5-6	do	120	50	--	do
11-5-9*	Not in use	168	50	--	Chemung Formation
11-5-12*	Public supply	126	30	--	do
11-5-13*	do	265	50	--	Catskill and Chemung Formations
11-5-16*	do	325	50	--	do
			Harrison County		
12-6-4	Stock and irrigation	42	50	--	Conemaugh Group
12-6-21	Domestic	78	100+	--	do
12-8-2	Stock	28	60	--	do
			Taylor County		
13-1-1	Girl Scout Camp	76	34**	45 (10 min. test)	Allegheny Group
13-2-2	Not in use	128	50	--	Conemaugh Group

* In Youghiogheny River Basin.

** Figure given was pump capacity. Maximum yield of well may be as high as 560 gpm.

APPENDIX B

Stream-Gaging Stations in The Monongahela River Basin

Streamflow measuring stations in the Monongahela River basin

Map No.	Station	Drainage area in square miles	U.S.G.S. period of record	Flood data			Discharge minimum daily cfs	Calendar year of Occurrence	Average dis-charge cfs
				Discharge maximum cfs	Gage height in ft above zero of gage	Calendar year of Occurrence			
1	**Tygart R. nr. Dailey, W. Va.**	187	1915-62	13,100	17.2	1932	0	1930-53	344
4	**Tygart R. nr. Elkins, W. Va.**	272	1944-62	10,700	14.45	1954	0.1	1959	493
9	**Tygart R. at Belington, W. Va.**	408	1907-62	18,400 (21,200	20.3 21.7	1912 1888)	0.1	1930	798
10	**Middle Fork at Midvale, W. Va.**	122	1915-42	11,400	18.5	1939	0	1930	282
11	**Middle Fork R. at Audra, W. Va.**	149	1942-62	9,780	13.02	1954	0.2	1953	340
14	**Sand Run nr. Buckhannon, W. Va.**	14.5	1947-62	2,580	6.26	1954	0	Several	26.5
15	**Buckhannon River at Hall, W. Va.**	277	1915-62	12,200	14.7	1918,37	0.2	1930	594
16	**Big Run at Volga, W. Va.**	6.19	1941-45	473	2.38	1942	0	1944	—
17	**Tygart R. at Philippi, W. Va.**	916	1940-62	33,600	24.10	1954	4.9	1953	1,833
18	**Tygart R. at Arden, W. Va.**	945	1936-37 1938-40	31,700	19.66	1939	11	1939	--
19	**Tygart R. at Tygart Dam nr. Grafton, W. Va.**	1,184	1938-62	20,000	--	1939	0	1938	2,309
20	**Tygart R. at Fetterman, W. Va.**	1,304	1907-38	74,300	29.1	1912	1.2	1930	2,599
21	**Tygart R. at Colfax, W. Va.**	1,366	1939-62	22,500	16.86	1948	129	1941	2,623
22	**Skin Creek nr. Brownsville, W. Va.**	25.7	1945-60	2,280	7.90	1957	0	Several	41.4
23	**West Fork R. at Brownsville, W. Va.**	102	1946-62	6,420	17.20	1950	0	Several	171
26	**West Fork R. at Butcherville, W. Va.**	181	1915-62	18,000	16.81	1950	0	1919,22	306
39	**West Fork R. at Clarksburg, W. Va.**	384	1923-62	16,900	11.15	1950	0	Several	599
40	**Elk Creek at Quiet Dell**	84.6	1943-62	--	17.4	1957	0.2	1952	124
44	**Salem Fk. subwatershed, No. 11a, W. Va.**	0.29	1955-62	11	13.95	1956	0	Several	0.427
45	**Salem Fk. subwatershed, No. 9, W. Va.**	0.92	1956-62	25.8	19.80	1956	0	Several	1.47
46	**Salem Fk. at Salem, W. Va.**	8.32	1951-62	2,280 (2,900	11.88 13.6	1955 1950)	0	Several	11.7
48	West Fk. R. at Enterprise, W. Va.	759	1907-16 1933-62	31,400	25.56	1948	4.0	1934	1,169
51	Buffalo Cr. at Barrackville, W. Va.	115	1907-09 1915-24 1932-62	9,490 (11,600	16.2 18	1917 1912)	0	1908	170
52	Monongahela R. at Lock 15, at Hoult, W. Va.	2,388	1915-26 1939-62	91,500	21.2 (26	1919 1888)	195 33	1940 1917	4,128

Streamflow measuring stations in the Monongahela River basin

Map No.	Station	Drainage area in square miles	U.S.G.S. period of record	Flood data			Discharge minimum daily cfs	Calendar year of Occurrence	Average discharge cfs
				Discharge maximum cfs	Gage height in ft. above zero of gage	Calendar year of Occurrence			
55	**Deckers** Creek at Morgantown, W. Va.	63.2	1946-62	5,680	10.12	1956	0.6	1953	108
58	**Monongahela** R. at Lock 8, Pt. Marion, Pa.	2,720	1929-55	90,400	22.33	1936	235	1940	4,519
59	Gandy Creek at Horton, W. Va.	36	1924-26	550	2.70	1924	3	1925	—
62	Laurel Fork at Wymer, W. Va.	44	1924-26	1,100	3.30	1925	1	1925	--
63	Glady Fork at Evenwood, W. Va.	41	1924-26	1,010	3.10	1925	1	1925	—
64	Dry Fork at Hendricks	345	1941-62	47,000	15.23	1954	6.0	1946,53	744
66	Blackwater R. above Beaver Cr. nr. Davis, W. Va.	58.7	1929-32	1,640	5.00	1932	2.3	1930	—
67	Blackwater R. at Davis, W. Va.	86.2	1921-62	7,170	13.20	1924	1.6	1959	191
68	No. Fk. Blackwater R. at Douglas, W. Va.	17.9	1929-31	1,020	3.81	1929	1.6	1930	—
69	Blackwater R. at Hendricks, W. Va.	140	1911-14	--	8.37	1917	25	1913	—
71	Shavers Fork at Cheat Bridge, W. Va.	57.5	1922-26	4,210	8.60	1924	4	1925	—
72	Shavers Fork at Bemis, W. Va.	115	1922-25	--	15.3	1918	11	1925	—
73	Shavers Fork at Flint, W. Va.	124	1924-32	8,800	9.54	1928	1.6	1931	319
75	Shavers Fork at Parsons, W. Va.	214	1911-26 1941-62	16,000 (25,000 (25,000	12.34 12.5 12.5	1954 1907) 1888)	3	1914	555
76	Cheat River nr. Parsons, W. Va.	718	1913-62	52,100	19.08	1954	10	1930	1,664
79	Cheat River at Rowlesburg, W. Va.	972	1924-62	66,300	15.67	1954	10	1930	2,232
84	Big Sandy Creek at Rockville, W. Va.	200	1909-18 1921-62	21,300	18.0	1912	0.1	1953	425
85	Cheat River nr. Pisgah, W. Va.	1,354	1902-5 1927-58	127,000	30.10	1954	13	1953	2,988
86	Cheat River nr. Morgantown, W. Va.	1,380	1909-17 1923-25	86,300 (160,000	13.99 18.7	1924 1888)	99	1914	3,190

Streamflow measuring stations in the Monongahela River basin

Map No.	Station	Drainage area in square miles	U.S.G.S. period of record	Flood data: Discharge maximum cfs	Flood data: Gage height in ft. above zero of gage	Flood data: Calendar year of Occurrence	Discharge minimum daily cfs	Calendar year of Occurrence	Average discharge cfs
91	Dunkard Creek at Shannopin, Pa.	229	1941-62	16,800	14.02	1941	0.4	1944	279
93	Monongahela River at Greensboro, Pa.	4,407	1939-62	140,000	{28.9 {(36	1954} 1888)}	204	1946	8,192
97	South Fk. Tenmile Cr. at Jefferson, Pa.	180	1932-62	13,800	18.45	1941	0.05	1938	203
100	Dunlap Creek at Allison, Pa.	33.1	1943-51	1,300	6.17	1950	6.6	1943	44.4
103	Redstone Cr. at Waltersburg, Pa.	73.7	1943-62	4,400	11.83	1954	4.2	1962	101
106	Monongahela River at Charleroi, Pa.	5,213	1934-62	140,000 (156,000	-- 26.1	1954 1888)	--	--	9,044
111	Youghiogheny River nr. Oakland, Md.	134	1941-62	11,800	12.16 (15.3	1954 1936)	2.5	1953	288
112	Youghiogheny River at Friendsville, Md.	295	1898-1904 1941-62	13,000 (15,600	8.99 10.2	1954 1924)	10	1957	645
113	Youghiogheny River at Youghiogheny River Dam, Pa.	436	1940-62	13,700	11.28	1948	0	1950	851
115	Casselman River at Grantsville, Md.	62.5	1947-62	8,400	10.70	1954	0	1962	117
118	Big Piney Run nr. Salisburg, Pa.	24.5	1932-62	6,850	8.56	1954	0.08	1953,57	38.2
127	Casselman River at Markleton, Pa.	382	1921-62	50,000	14.06	1954	10	1957	649
133	Laurel Hill Creek at Ursina, Pa.	121	1919-62	10,900	10.63	1954	2.2	1932	264
135	Youghiogheny River below Confluence, Pa.	1,029	1940-62	69,500 (85,000	19.92 21.6	1954 1936)	121	1943	1,956
137	Youghiogheny River at Ohiopyle, Pa.	1,062	1927-50	82,100	13.30	1936	43	1930	1,957
143	Poplar Run nr. Normalville, Pa.	9.27	1962	530	4.60	1962	.1	1962	--
148	Youghiogheny River at Connellsville, Pa.	1,326	1908-62	103,000	21.96	1954	11	1908 1910	2,515
151	Green Lick Run at Green Lick Reservoir, Pa.	3.07	1941-62	1,400	5.1 (5.42	1943 1944)	0.04	1957	5.53
157	Youghiogheny River at Sutersville, Pa.	1,715	1921-62	108,000	32.5	1954	57	1922	2,962
161	Abers Creek nr. Murrysville, Pa.	4.39	1949-62	1,600	7.75	1950	0	Several	5.39
162	Turtle Creek at Trafford, Pa.	55.9	1921 1932-53	5,200	10.05	1946	0.1	1922,39	77.2
164	Monongahela River at Braddock, Pa.	7,337	1939-62	201,000 (210 000	31.20 38.8	1941 1936)	703	1946	12,470

APPENDIX C

Continuous Records of Chemical Quality of Streams

54 MONONGAHELA RIVER AT MORGANTOWN, W. VA.

LOCATION.--At Morgantown public water supply intake at Morgantown, Monongahela County, 800 feet upstream from Cobun Creek, and 1.5 miles upstream from Deckers Creek.

DRAINAGE AREA.--2,572 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956.

REMARKS.--Integrated samples collected 12 feet from right bank at intake to River Station treatment plant. River receives industrial waste above station. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1955 to September 1956

Date of collection	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Immediate acidity (H+)	Potential free acidity (H+)	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 14, 1955	5.5	1.3	0.76	1.0	33	9.8	10	2.2	0	165	9.0	0.3	1.0	250	123	123	0.3	0.4	416	4.15	1
Nov. 15	8.5	1.6	2.7	1.4	45	14	25	2.3	0	221	14	.2	.8	331	170	170	.5	.6	515	4.10	3
Dec. 15	5.3	.3	1.9	.50	16	6.0	7.8	.8	0	76	5.0	.1	2.2	126	65	65	.2	.2	221	4.9	1
Jan. 17, 1956	5.5	.9	5.2	.89	31	11	26	1.5	2	174	14	.2	1.2	270	123	121	.5	.5	425	4.7	0
Feb. 17	6.0	1.7	1.5	.46	22	7.2	5.5	1.4	0	96	2.8	.0	2.5	147	84	84	.2	.2	251	4.35	1
Mar. 15	5.4	.5	1.2	.58	21	7.2	4.8	1.3	2	87	3.0	.1	1.3	136	82	80	.1	.0	214	4.8	2
Apr. 17	6.8	2.1	7.8	.84	32	10	16	1.0	0	163	3.5	.2	.3	248	121	121	.4	.5	400	4.00	0
May 17	7.3	.7	a2.7	a.39	21	6.9	8.3	1.4	0	96	4.9	.4	.7	158	81	81	.4	.4	247	4.15	1
June 15	8.3	1.2	.34	.62	23	7.1	13	1.2	0	116	5.6	.3	.8	181	87	87	.2	.2	290	4.40	2
July 17	6.1	.6	.34	.50	19	6.1	7.8	1.3	0	86	5.4	.2	.4	135	72	72	.1	.1	233	4.5	2
Aug. 16	6.6	1.4	a.71	a.52	15	4.9	5.0	1.8	0	78	1.8	.1	.7	126	58	58	.3	.3	217	3.95	2
Sept. 21	7.7	1.2	a1.5	.99	40	11	26	2.1	0	196	7.2	.4	.2	324	145	145	--	--	491	3.90	2

a Total

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956.
Water temperatures: October 1955 to September 1956.
EXTREMES, 1955-56.--Dissolved solids: Maximum, 464 ppm Oct. 21-29, 31; minimum, 105 ppm June 1-10.
Hardness: Maximum, 233 ppm Oct. 21-29, 31; minimum, 54 ppm June 1-10.
Specific conductance: Maximum daily, 1,080 micromhos Oct. 21; minimum daily, 136 micromhos June 8.
Water temperatures: Maximum, 79° F June 11-12; minimum, freezing point Dec. 26, Jan. 14.
REMARKS.--Acidity determined to pH 7.0. Records of specific conductance of daily samples available in district office at Columbus, Ohio. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1955 to September 1956

Date of Collection	Mean discharge (cfs)	Silica (SiO$_2$)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO$_3$)	Sulfate (SO$_4$)	Chloride (Cl)	Fluoride (F)	Nitrate (NO$_3$)	Dissolved solids (residue on evaporation at 180° C)	Hardness as CaCO$_3$ Calcium, magnesium	Hardness as CaCO$_3$ Non-carbonate	Immediate acidity (H$^+$)	Potential free acidity (H$^+$)	Specific conductance (micromhos at 25° C)	pH	Color
Oct. 1-10, 1955		7.4	3.2	[illegible]	1.8	35	13	30	1.4	0	212	10	0.4	0.1	344	141	141	1.3	1.5	830	3.70	0
Oct. 11-20		8.8	2.9	[illegible]	1.6	51	17	35	2.8	0	287	12	.5	.0	438	197	197	.9	1.1	732	3.80	--
Oct. 21-29, 31		8.7	3.5	[illegible]	1.8	62	19	35	2.7	0	320	15	.4	.8	464	233	233	.8	1.1	762	3.70	1
Nov. 1-10		9.2	2.3	5.7	1.6	54	18	27	3.2	0	261	13	.4	.9	403	209	209	.5	.6	639	4.20	1
Nov. 11-20		7.9	2.0	4.5	1.4	44	15	31	3.1	0	232	18	.3	1.4	356	172	172	.6	.8	586	3.80	1
Nov. 21-30		6.4	.5	2.2	.75	33	9.8	14	1.3	0	134	8.5	.2	1.5	212	123	123	.2	.2	341	4.40	1
Dec. 1-10		6.2	.6	2.7	.44	24	7.4	11	.3	0	106	8.5	.2	1.3	167	90	90	.2	.2	282	4.30	1
Dec. 11-20		5.8	.6	3.2	.33	17	6.0	9.3	1.6	0	83	8.0	.2	1.9	133	67	67	.2	.3	234	3.95	2
Dec. 21-31		6.8	.9	5.3	.65	[illegible]	7.6	19	1.7	0	128	11	.2	1.4	207	94	94	.3	.4	364	3.80	1
Jan. 1-10, 1956		8.5	2.5	7.7	1.0	44	12	33	2.0	0	235	17	.6	1.8	352	159	159	.6	.8	583	3.70	4
Jan. 12-20		7.2	2.0	5.9	.89	32	13	23	1.8	0	180	12	.4	1.2	263	133	133	.4	.5	474	3.80	2
Jan. 21-31		7.3	1.8	6.0	1.1	38	11	26	1.5	0	186	11	.5	1.6	293	140	140	.5	.4	469	3.90	1
Feb. 1,2,4, 6-10		5.3	.3	2.8	.49	21	6.2	5.0	2.1	0	79	5.0	.1	3.5	130	78	78	.0	.0	208	4.35	3
Feb. 11-20		5.6	1.2	2.1	.08	18	6.5	5.5	1.7	0	85	3.5	.3	1.1	134	72	72	.3	.3	238	3.90	2
Feb. 21-29		7.2	.8	2.6	.46	22	6.4	6.1	1.6	0	89	3.0	.3	2.3	142	81	81	.3	.3	239	4.10	0
Mar. 1-10		6.0	1.9	3.1	.14	23	8.1	8.2	1.3	0	113	3.5	.2	.8	168	91	91	.4	.4	299	3.90	1
Mar. 11-20		5.8	1.5	1.8	.55	20	6.8	6.4	1.3	0	93	2.8	.2	.5	145	78	78	.3	.3	252	4.3	1
Mar. 22-24, 26-31		6.8	1.3	4.2	.42	25	8.6	8.8	1.7	0	113	3.5	.1	1.1	175	98	98	.4	.4	300	4.00	3
Apr. 1-10		6.4	1.7	2.6	.49	25	7.8	8.7	1.3	0	118	3.2	.2	.5	180	94	94	.3	.4	298	4.10	0
Apr. 11-20		7.1	2.7	4.6	.68	27	9.0	12	1.1	0	140	4.0	.2	1.2	209	104	104	.5	.6	388	3.80	1
Apr. 21-23, 25-30		8.7	4.2	7.5	1.0	39	15	21	1.4	0	221	7.2	.4	.4	324	159	159	.8	.7	557	3.50	4
May 1-10		8.0	3.5	5.7	.15	34	11	19	1.7	0	194	7.5	.3	.2	287	130	130	1.1	.2	472	3.40	2
May 11-20		7.4	1.3	4.2	.67	27	9.6	12	1.0	0	[illegible]	5.2	.2	.4	206	107	107	.5	.4	335	4.10	2
May 21-31		7.1	1.4	1.7	.62	22	7.3	9.7	1.5	0	[illegible]	3.8	.2	1.1	162	85	85	.2	.4	283	4.10	1
June 1-10		6.6	.6	2.0	.37	14	4.7	6.6	1.2	0	67	2.8	.1	.8	105	54	54	.1	.2	187	4.30	1
June 11-20		6.5	3.5	5.8	.72	27	9.4	18	1.4	0	165	5.0	.3	[illegible]	242	106	106	.7	.8	447	3.50	1
June 21-30		[illegible]	1.9	3.0	.76	36	9.6	16	1.8	0	177	4.8	[illegible]	.9	256	129	129	.4	.4	439	3.85	1
July 1-10		7.9	3.0	2.0	.53	30	9.1	18	1.7	0	171	4.5	.3	.2	251	112	112	.6	.7	453	3.65	4
July 11-20		8.8	3.7	.20	1.2	43	12	22	1.8	0	230	6.8	.4	.9	334	157	157	.6	.8	586	3.60	1
July 21-28, 30-31		9.2	1.4	2.2	.91	32	7.3	16	2.4	0	147	5.5	.2	.9	228	110	110	.2	.3	364	4.15	2
Aug. 1-10		6.4	.5	1.5	.20	20	5.5	7.0	1.8	0	86	2.5	.1	1.7	135	72	72	.1	.1	220	4.9	3
Aug. 11-20		8.4	2.7	4.6	.92	22	6.2	9.8	1.6	0	122	3.4	.2	.7	181	80	80	.5	.6	354	3.65	2
Aug. 21-31		9.3	2.5	3.3	1.0	30	8.2	13	1.7	0	155	4.3	.2	.9	229	108	108	.5	.6	408	3.70	2
Sept. 1-10		9.5	4.1	4.4	.96	36	11	27	2.1	0	209	7.3	.3	.8	314	135	135	.8	.8	543	3.50	0
Sept. 11-20		9.4	3.3	6.7	.92	34	10	18	2.4	0	186	6.3	.2	1.0	289	126	126	.7	.8	514	3.80	1
Sept. 21-24, 26-30		9.7	4.4	9.0	1.3	41	11	24	2.7	0	236	9.2	.2	.6	349	148	148	.9	1.0	589	3.45	1
a Time-weighted average		7.4	2.1	3.9	0.80	[illegible]	9.8	17	1.7	0	161	7.1	0.3	1.0	245	118	118	0.5	0.5	418	--	2

a Represents 90% of days.

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 780 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 554 ppm May 21-31; minimum, 110 ppm Feb. 1-10.
Hardness: Maximum, 251 ppm May 21-31; minimum, 60 ppm Feb. 1-10.
Specific conductance: Maximum daily, 1,020 micromhos May 30; minimum daily, 153 micromhos Feb. 4-5.
Water temperatures: Maximum, 78° F July 28; minimum, freezing point Jan. 12, 17-20.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 554 ppm May 21-31, 1957; minimum, 105 ppm June 1-10, 1956.
Hardness: Maximum, 251 ppm May 21-31, 1957; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,080 micromhos Oct. 21, 1955; minimum daily, 136 micromhos June 8, 1956.
Water temperatures: Maximum, 79° F June 11-12, 1956; minimum, freezing point on several days during winter months.
REMARKS.--Acidity determined to pH 7.0. Records of specific conductance of daily samples available in district office at Columbus, Ohio. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of Collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Immediate acidity (H^+)	Potential free acidity (H^+)	Specific conductance (micromhos at 25° C)	pH	Color
																Calcium, magnesium	Noncarbonate					
Oct. 1-7, 9-10, 1956		8.5	8.3	10	1.6	52	16	29	2.8	0	309	10	0.3	0.6	450	196	196	1.2	1.4	768	3.40	1
Oct. 11-20		9.6	7.0	4.0	1.6	43	14	32	2.4	0	275	16	.6	.8	403	165	165	1.2	1.1	704	3.20	1
Oct. 21-31		10	5.6	7.1	2.7	46	13	31	1.6	0	270	12	.2	.4	418	168	168	1.1	1.0	697	3.50	3
Nov. 1-8, 10		8.4	2.9	3.4	1.2	42	11	30	1.5	0	218	10	.2	.5	352	150	150	.4	.4	536	3.90	2
Nov. 11-20		6.3	2.2	2.2	.10	18	5.9	11	1.4	0	98	7.0	.1	.2	163	69	69	.4	.3	308	3.90	4
Nov. 22-29		6.6	.8	3.8	1.1	26	7.8	19	1.9	0	134	5.8	.2	.6	224	96	96	.3	.3	373	4.10	3
Dec. 1-10		5.8	.6	3.9	.84	21	5.6	14	1.4	0	103	5.4	.2	.7	172	76	76	.3	.2	299	4.1	1
Dec. 11-20		5.8	.4	3.0	.92	20	5.6	4.5	2.1	0	80	3.8	.1	2.6	135	73	73	.1	.1	210	4.5	1
Dec. 21-29, 31		6.2	.4	1.0	.61	16	5.5	5.7	1.8	1	68	2.1	.2	1.6	115	62	62	.1	.1	182	4.6	1
Jan. 1-7, 9-10, 1957		6.6	1.2	3.2	1.8	23	7.6	9.4	.4	0	108	23	.2	1.6	177	88	88	.3	.2	281	4.20	2
Jan. 11-20		6.2	.7	2.0	.67	17	6.6	6.2	1.2	0	81	3.0	.1	1.3	119	70	70	.2	.2	194	4.25	1
Jan. 22-31		6.0	.8	1.8	.04	22	7.4	8.2	1.1	0	97	5.3	.1	2.1	158	86	86	.2	.2	256	4.40	2
Feb. 1-10		5.3	.4	1.7	.07	16	4.9	4.5	.7	1	69	2.2	.1	2.0	110	60	59	.1	.1	176	4.8	1
Feb. 11-20		5.0	.7	2.0	.09	17	5.3	6.3	1.0	0	76	1.6	.1	.8	120	64	64	.2	.1	201	4.45	1
Feb. 21-26, 28		6.4	2.5	4.8	.93	27	10	13	.7	0	144	5.5	.2	1.8	213	109	109	.4	.4	387	4.00	1
Mar. 1-10		6.0	1.2	2.5	.04	21	6.8	7.8	1.0	0	98	2.5	.1	1.5	154	80	80	.2	.2	259	4.20	1
Mar. 11-20		6.5	1.3	3.9	.55	28	9.4	12	1.3	0	140	4.4	.2	1.8	212	109	109	.3	.3	353	3.95	3
Mar. 21-31		7.4	3.5	6.5	.97	38	12	22	1.3	0	215	8.2	.3	1.3	309	145	145	.6	.6	519	3.60	1
Apr. 1-10		6.4	.0	1.9	.62	30	8.0	10	1.5	0	118	3.6	.2	1.4	192	108	108	.0	.0	295	4.35	3
Apr. 11, 13-20		6.2	1.3	3.0	.74	20	6.4	9.0	.9	0	98	4.0	.2	1.4	144	78	78	.3	.2	266	4.10	1
Apr. 21-30		8.1	2.7	2.6	1.3	43	14	20	1.6	0	223	5.2	.1	1.0	325	165	165	.6	.6	520	3.60	1
May 1-10		8.5	2.4	3.5	1.1	41	12	21	1.9	0	218	5.6	.4	1.0	311	152	152	.6	.5	526	3.60	2
May 11-20		9.7	3.9	8.1	1.2	45	16	29	1.8	0	271	10	.5	.7	394	178	178	.8	.9	630	3.35	1
May 21-31		10	4.6	8.4	1.9	66	21	47	2.2	0	384	12	.2	.5	554	251	251	1.0	1.0	868	3.45	2
June 1-7, 9-10		9.5	4.6	1.2	1.6	66	18	38	2.2	0	350	14	.4	.7	528	230	230	1.1	1.1	855	3.20	2
June 11-16, 18-19		8.4	3.5	2.3	1.3	44	14	33	2.5	0	289	9.0	.3	.7	379	168	168	.8	.7	696	3.45	1
June 21-30		7.7	3.1	.94	1.2	38	9.5	28	2.5	0	210	8.3	.2	.6	302	127	127	.8	.7	568	3.45	1
July 1-6, 8, 10		6.8	1.6	.12	1.1	32	12	21	1.5	0	175	7.0	.2	.4	272	130	130	.4	.4	621	3.55	2
July 11-19		6.5	2.4	.74	.70	25	7.8	16	1.4	0	165	10	.1	.9	204	94	94	.6	.6	484	3.50	1
July 21-31		7.4	3.0	1.2	1.0	32	10	26	1.7	0	198	14	.1	.9	280	121	121	.8	.8	508	3.40	1
Aug. 1-6, 8-10		8.0	2.8	.82	.90	38	12	34	2.1	0	236	12	.3	.6	363	148	148	.8	.6	630	3.50	1
Aug. 11-20		8.6	1.9	1.9	.31	42	15	41	2.2	0	280	13	.3	.4	416	164	164	1.7	1.6	719	3.45	3
Aug. 21-31		8.8	3.4	.59	1.4	44	18	45	2.7	0	298	16	.5	.8	439	184	184	.8	.8	761	3.40	3
Sept. 1, 3-4, 6-7, 9-10		8.7	3.4	1.2	.79	44	14	42	2.3	0	294	16	.4	.7	421	188	188	1.0	.9	745	3.45	3
Sept. 11-20		8.4	4.2	1.4	1.7	56	16	50	2.9	0	319	30	.5	.7	482	206	206	.9	.9	826	3.45	1
Sept. 21-30		7.1	3.1	.88	1.3	42	12	36	2.5	0	244	21	.2	.9	368	155	155	.6	.6	652	3.50	1
a Time-weighted average		7.4	2.6	2.8	1.0	34	11	22	1.7	0	192	9.4	.2	1.0	289	130	130	.6	.6	487	--	2

a Represents 95 percent of days.

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LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1958.
Water temperatures: October 1955 to September 1958.
EXTREMES, 1957-58.--Dissolved solids: Maximum, 526 ppm Oct. 11-20; minimum, 100 ppm Aug. 2-7, 9-10.
Hardness: Maximum, 261 ppm Oct. 21-31; minimum, 57 ppm Aug. 2-7, 9-10.
Specific conductance: Maximum daily, 1,200 micromhos June 19; minimum daily, 124 micromhos Aug. 7.
Water temperatures: Maximum, 70° F July 10; minimum, freezing point on many days during November to March.
EXTREMES, 1955-58.--Dissolved solids: Maximum, 554 ppm May 21-31, 1957; minimum, 100 ppm Aug. 2-7, 9-10, 1958.
Hardness: Maximum, 261 ppm Oct. 21-31, 1957; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,200 micromhos June 19, 1958; minimum daily, 124 micromhos Aug. 7, 1958.
Water temperatures: Maximum, 79° F June 11-12, 1956; minimum, freezing point on many days during winter months.
REMARKS.--Acidity determined to pH 7.0. Specific conductance of daily samples available in district office at Columbus, Ohio. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1957 to September 1958

Date of Collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Immediate acidity (H^+)	Potential free acidity (H^+)	Specific conductance (micromhos at 25° C)	pH	Color
																Calcium, magnesium	Noncarbonate					
Oct. 1-10, 1957		8.6	4.1	1.2	0.81	52	16	49	3.1	0	327	19	0.4	0.8	473	196	196	0.8	0.8	795	3.5	1
Oct. 11-20		9.2	4.4	2.9	.86	62	19	49	2.6	0	363	14	.3	1.0	526	233	233	.9	.9	851	3.5	2
Oct. 21-31		9.8	2.7	2.2	2.0	65	24	32	3.3	0	324	10	.4	1.3	494	261	261	.5	.5	731	3.90	1
Nov. 1-9		10	1.5	1.7	1.1	43	12	17	3.0	0	200	9.0	.2	2.5	293	157	157	.4	.3	479	3.9	3
Nov. 11-20		7.6	1.8	.41	.97	31	8.8	19	2.2	0	162	8.0	.2	1.3	246	114	114	.3	.2	389	4.25	2
Nov. 21-30		6.3	.5	1.3	.86	32	9.0	18	1.9	4	152	8.0	.2	1.2	223	117	114	.1	.1	360	4.8	4
Dec. 1-4, 6-10		5.9	.5	1.9	.41	26	7.2	10	1.9	0	112	6.0	.2	1.6	172	94	94	.1	.1	279	4.5	4
Dec. 11-20		5.6	.8	1.7	.48	17	5.1	7.2	.8	1	76	3.5	.1	1.1	117	64	62	.2	.1	195	4.7	1
Dec. 21-31		6.5	.4	1.4	.50	24	6.8	7.1	1.5	2	101	4.0	.1	2.6	159	88	86	.1	.0	249	5.0	2
Jan. 1-10, 1958		6.5	2.0	4.0	.48	23	6.7	9.5	1.1	0	120	4.0	.2	2.3	179	85	85	.4	.4	297	4.20	4
Jan. 11-20		7.2	2.1	4.8	1.1	32	9.4	8.8	.6	0	160	6.5	.2	.9	235	119	119	.4	.4	391	4.00	55
Jan. 21-31		5.7	.5	2.6	.44	19	5.6	6.2	1.0	1	80	4.0	.2	2.1	122	70	70	.1	.1	209	4.6	1
Feb. 1-10		6.7	1.2	3.2	.62	26	8.0	10	1.2	0	119	4.5	.2	1.1	176	98	98	.2	.2	303	4.20	2
Feb. 11-20		5.8	1.6	5.5	.60	23	6.6	8.8	.7	0	105	10	.1	2.3	168	84	84	.3	.3	292	4.00	1
Feb. 21-28		7.4	2.4	5.3	.87	36	11	15	1.2	0	174	7.5	.3	1.0	266	135	135	.5	.4	440	3.85	2
Mar. 1-10		8.4	.9	.73	.30	14	7.1	8.1	.8	0	83	3.0	.1	1.6	124	64	64	.2	.2	210	4.30	2
Mar. 11-20		7.0	2.7	4.8	.92	33	10	15	1.1	0	169	5.5	.3	.7	248	124	124	.5	.5	437	3.70	3
Mar. 21-31		5.8	.5	2.9	.63	25	8.3	9.5	1.0	0	113	4.5	.3	2.0	178	96	96	.1	.1	290	4.6	1
Apr. 1-2, 4-10		5.5	.8	2.2	.49	20	6.0	8.1	.7	0	93	4.0	.3	1.7	148	74	74	.2	.2	248	4.40	1
Apr. 11-17, 19-20		5.4	1.1	3.1	.50	18	5.6	7.0	.5	0	87	4.0	.3	1.5	135	68	68	.2	.2	243	4.10	1
Apr. 21-30		6.4	1.6	3.4	.54	28	8.3	12	1.0	0	137	7.0	.2	.5	206	104	104	.4	.4	383	3.80	3
May 1-10		5.8	.2	1.6	.42	18	4.9	4.5	.5	-	69	5.0	.1	1.3	117	65	64	.1	.0	188	4.8	2
May 11-20		6.7	2.0	3.1	.49	23	7.2	9.2	.9	0	108	2.5	.2	1.0	179	87	87	.4	.4	306	3.95	2
May 21-31		9.3	5.1	.36	1.2	46	16	24	1.6	0	265	4.0	.2	.9	382	181	181	1.1	1.0	642	3.50	3
June 1-4		9.4	5.2	5.7	1.4	52	16	28	1.7	0	294	8.0	.4	.9	423	196	196	1.3	1.3	708	3.45	2
June 11-20		10	5.3	2.9	1.8	64	20	39	2.0	0	364	13	.5	.7	521	242	242	1.5	1.4	882	3.40	2
June 21-30		8.2	1.4	1.8	.73	28	8.0	12	1.3	0	135	5.5	.2	.8	204	103	103	.4	.4	383	4.00	2
July 1-10		6.8	1.7	.47	.69	30	8.8	16	1.8	0	150	5.5	.2	.7	224	111	111	.4	.4	381	3.90	1
July 18, 20		4.9	.3	.79	.80	23	5.4	5.7	1.8	0	86	2.0	.1	1.2	136	80	80	.1	.2	216	5.2	10
July 21-24, 26, 28-31		6.6	.2	.80	.27	21	5.8	5.6	1.8	2	81	1.0	.1	1.0	128	76	74	.1	.0	208	5.2	2
Aug. 2-7, 9-10		6.2	.1	.62	.28	16	4.2	4.8	1.4	4	61	1.5	.1	.7	100	57	54	.0	.0	165	5.9	2
Aug. 11-13, 15-19		6.5	.2	.72	.48	18	5.0	6.9	1.4	2	77	2.5	.1	.6	134	66	64	.1	.1	199	5.0	2
Aug. 21-23		9.1	1.1	.10	.71	27	8.0	11	2.0	0	124	2.5	.2	.5	185	101	101	.2	.2	313	4.20	4
Sept. 11-20		11	3.3	.33	1.3	46	14	33	2.2	0	246	5.0	.4	.3	361	173	173	.9	.8	596	3.60	0
Sept. 21-30		9.2	3.3	1.2	.82	50	15	29	2.2	0	264	6.0	.4	.8	396	187	187	.7	.8	649	3.65	1
a Time-weighted averages		7.2	1.8	2.2	0.76	32	9.9	16	1.5	0	162	6.2	0.2	1.2	244	121	121	0.4	0.4	403	--	4

a Represents 80 percent of days.

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analysis: October 1955 to September 1959.
Water temperatures: October 1955 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 620 ppm July 21-27, 29-31; minimum, 118 ppm Jan. 22-31.
Hardness: Maximum, 280 ppm July 21-27, 29-31; minimum, 66 ppm Jan. 22-31.
Specific conductance: Maximum daily, 1,090 micromhos July 25; minimum daily, 163 micromhos Jan. 27-28.
Water temperatures: Maximum, 82° F on several days during July to September.
EXTREMES, 1955-59.--Dissolved solids: Maximum, 620 ppm July 21-27, 29-31, 1959; minimum, 100 ppm Aug. 2-7, 9-10, 1956.
Hardness: Maximum, 280 ppm July 21-27, 29-31, 1959; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,200 micromhos June 19, 1958; minimum daily, 124 micromhos Aug. 7, 1956.
Water temperatures: Maximum, 82° F on several days during July to September 1959; minimum, freezing point on many days during most winters.
REMARKS.--Acidity determined to pH 7.0. Specific conductance of daily samples available in district office at Columbus, Ohio. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of Collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180° C)	Hardness as $CaCO_3$		Immediate acidity (H^+)	Potential free acidity (H^+)	Specific conductance (micromhos at 25° C)	pH	Color
																Calcium, magnesium	Noncarbonate					
Oct. 1, 4-10, 1958--		8.8	2.0	0.52	0.87	43	12	19	2.2	0	203	3.0	0.2	0.7	310	157	157	0.4	0.4	482	3.95	5
Oct. 12-13, 15-20---		10	2.5	.43	1.2	50	16	23	2.4	0	250	6.5	.5	.3	374	191	191	.8	.7	592	3.70	1
Oct. 21-23, 25-31---		11	2.8	.68	1.0	41	14	25	1.9	0	220	6.0	.2	.2	335	160	160	.7	.6	547	3.80	2
Nov. 1-7, 9-10------		8.3	2.6	2.6	1.3	43	13	31	2.0	0	238	6.0	.4	.4	348	161	161	.6	.5	564	3.80	3
Nov. 11-19----------		7.0	1.3	1.2	1.0	36	10	21	1.9	0	182	6.0	.2	.4	273	131	131	.4	.3	450	3.80	3
Nov. 21-30----------		7.1	.5	1.1	.95	28	6.3	13	1.5	0	123	4.0	.1	.4	183	96	96	.4	.2	309	4.10	3
Dec. 1-10-----------		6.5	.1	1.9	.70	28	6.9	11	1.5	2	112	4.0	.1	1.1	177	98	97	.1	.0	271	5.4	3
Dec. 11-20----------		6.2	.4	2.1	.18	20	5.5	4.8	.7	0	86	3.5	.2	.8	152	72	72	.2	.1	228	4.6	3
Dec. 21-30----------		7.0	1.1	4.8	.47	27	8.2	13	.6	0	140	5.5	.3	.7	238	101	101	.3	.3	369	3.90	3
Jan. 1-2, 1959------		7.8	.3	.20	.07	40	12	23	1.8	0	191	9.0	.2	.9	314	150	150	.2	.2	452	4.10	4
Jan. 12-14, 16-20---		5.8	.0	.10	.15	22	6.1	7.5	1.4	0	93	4.0	.1	1.4	151	80	80	.1	.1	243	4.5	3
Jan. 22-31----------		9.2	.6	.94	.52	18	5.1	4.9	1.1	0	73	2.5	.1	1.2	118	66	66	.1	.1	194	4.30	3
Feb. 1-5, 7-10------		6.2	1.2	1.8	.46	24	7.2	9.1	.9	0	112	3.0	.2	.8	166	90	90	.3	.3	283	4.10	3
Feb. 11-16, 18-20---		6.1	.4	1.6	.19	23	6.8	5.9	.8	0	96	2.5	.1	.9	155	86	86	.1	.1	248	4.45	2
Feb. 21-28----------		6.6	.7	4.4	.63	24	8.0	8.8	.7	0	123	2.5	.1	.2	178	93	93	.4	.4	319	3.80	2
Mar. 1-10-----------		6.3	1.3	3.2	.35	25	8.4	9.6	.7	0	123	3.0	.1	.3	192	97	97	.3	.3	314	4.00	2
Mar. 11-20----------		5.7	1.1	3.2	.27	20	6.1	6.9	.9	0	93	2.5	.1	.4	138	75	75	.2	.2	242	4.10	5
Mar. 22-26----------		6.1	1.9	6.2	.56	25	7.7	11	.9	0	128	3.0	.1	.2	191	94	94	.4	.4	340	3.85	1
Apr. 4-9------------		6.3	1.3	2.8	.63	31	9.0	12	1.2	0	142	1.0	.2	.7	219	115	115	.2	.2	350	4.30	2
Apr. 11, 13-20------		5.9	.7	2.2	.14	24	7.7	7.8	1.0	0	105	1.0	.1	.8	162	92	92	.1	.1	289	4.45	1
Apr. 21-29----------		7.3	2.0	3.6	.97	30	8.2	12	1.1	0	152	7.0	.1	.3	204	109	109	.5	.5	393	3.70	0
May 1-6, 10---------		8.2	2.5	1.5	.94	44	14	21	2.0	0	219	8.0	.3	.5	338	168	168	.5	.5	508	3.90	4
May 11-20-----------		7.1	1.6	1.4	.75	30	8.4	12	1.6	0	143	3.0	.2	.5	220	110	110	.4	.3	363	3.95	4
May 21-31-----------		7.0	2.0	1.8	.67	26	7.7	13	1.2	0	136	5.8	.2	.3	220	96	96	.5	.5	382	3.85	3
June 1-8------------		6.5	.9	.74	.48	28	7.3	11	1.5	0	119	3.0	.2	.6	190	96	96	.2	.2	388	4.30	4
June 12-20----------		6.8	2.4	.88	.30	21	5.8	11	1.4	0	118	2.5	.1	.1	178	78	78	.6	.6	336	3.70	4
June 21-24, 28-30---		8.2	4.6	1.3	.99	32	10	18	1.6	0	210	4.0	.3	.2	312	121	121	1.2	1.1	582	3.30	4
July 3-10-----------		8.0	3.6	.99	1.1	33	12	22	1.8	0	220	3.0	.2	.1	306	137	137	1.0	.9	581	3.40	3
July 11-14, 16-20---		8.6	4.3	1.4	1.5	46	14	32	2.2	0	278	5.0	.3	.3	399	173	173	1.1	1.1	716	3.30	3
July 21-27, 29-31---		11	6.1	1.3	.18	78	22	51	2.7	0	424	6.0	.6	.3	620	280	280	1.4	1.4	997	3.30	3
Aug. 1-5, 7, 9-10---		9.3	5.1	1.0	.19	53	16	36	2.5	0	312	6.0	.4	.3	447	198	198	1.2	1.2	790	3.30	3
Aug. 12-17, 19-20---		10	5.2	1.4	2.2	73	22	46	3.0	0	399	7.0	.4	.3	577	273	273	1.2	1.2	941	3.30	3
Aug. 21-22, 24-26---		7.8	3.3	.96	1.7	59	16	31	2.8	0	312	11	.4	.3	442	213	213	1.1	1.0	788	3.45	3
Sept. 1, 3, 5-6,8-10		6.9	2.5	.81	1.1	36	16	24	2.0	0	206	6.5	.3	.2	287	156	156	.8	.8	576	3.50	3
Sept. 12, 19--------		6.5	2.1	.78	1.0	35	10	27	1.9	0	208	7.0	--	.7	262	129	129	.8	.6	562	3.56	--
Sept. 21-30---------		7.3	3.0	1.2	1.2	43	14	32	1.9	0	264	13	.4	.3	363	165	165	1.0	1.0	685	3.35	2
a Time-weighted average		7.5	2.0	1.8	0.73	34	10	18	1.6	0	178	4.6	0.2	0.5	266	126	126	0.5	0.5	448	--	3

a Represents 82 percent of days.

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8), at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1960.
Water temperatures: October 1955 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 583 ppm Nov. 7-8; minimum, 114 ppm Dec. 1-11, 15-31.
Hardness: Maximum, 287 ppm Nov. 7-8; minimum, 64 ppm Apr. 1-19.
Specific conductance: Maximum daily, 1,060 micromhos July 17; minimum daily, 137 micromhos Dec. 17-18.
Water temperatures: Maximum, not determined; minimum, 34° F Mar. 10-11.
EXTREMES, 1955-60.--Dissolved solids: Maximum, 620 ppm July 21-27, 29-31, 1959; minimum, 100 ppm Aug. 2-7, 9-10, 1958.
Hardness: Maximum, 287 ppm Nov. 7-8, 1959; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,200 micromhos June 19, 1958; minimum daily, 124 micromhos Aug. 7, 1958.
Water temperatures: Maximum, not determined; minimum, freezing point on many days during some winters.
REMARKS.--Acidity determined to pH 7.0. Specific conductance and pH of daily samples available in district office at Columbus, Ohio. Supplementary samples for determining iron and manganese were filtered clear when collected. No discharge records available for this station.

Chemical analyses, in parts per million, water year October 1959 to September 1960

Date of Collection	Silica (SiO$_2$)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO$_3$)	Sulfate (SO$_4$)	Chloride (Cl)	Fluoride (F)	Nitrate (NO$_3$)	Phosphorus as PO$_4$	Alkyl Benzene Sulfonate (ABS)	Dissolved solids (residue on evaporation at 180° C)	Hardness as CaCO$_3$		Acidity (H$^+$)		Specific conductance (micromhos at 25° C)	pH	Color
																	Calcium, magnesium	Noncarbonate	Immediate	Potential free			
Oct. 1-31, 1959	6.6	a3.7	1.5	0.50	32	12	24	1.7	0	202	8.0	0.5	0.2	0.20	0.0	281	132	132	a0.9	a0.9	537	3.60	1
Nov. 1-6, 9-14, 16-17	6.6	b3.3	1.4	1.6	43	14	25	2.3	0	230	10	.4	.5	.08	.0	322	165	165	b.8	b.8	565	3.70	2
Nov. 7-8	8.5	--	2.4	2.9	77	13	49	2.8	0	406	16	.3	.8	.08	.0	583	287	287	--	--	899	3.60	1
Nov. 18-27, 29	5.6	--	1.4	.9	23	8.3	11	1.4	0	112	6.0	.2	.9	.05	.0	164	92	92	--	--	300	4.30	2
Dec. 1-11, 15-31	5.5	c1.1	.90	1.3	17	6.1	5.5	.9	0	78	3.5	.1	1.3	.12	.0	114	68	68	c.5	[illegible]	216	4.35	1
Jan. 1-13, 15-31, 1960	6.0	--	1.9	.18	20	6.3	5.6	1.6	0	91	2.0	.1	.9	.15	.0	140	76	76	.6	.5	245	4.20	2
Feb. 1-17, 19-21, 23, 25-27, 29	6.8	1.3	2.8	.37	28	7.6	9.1	.9	0	126	5.0	.2	1.0	.04	.0	174	101	101	.2	.4	314	4.20	2
Mar. 1, 3-7, 9-16, 21-23, 25-26, 28-29, 31	5.9	d3.5	1.8	.70	31	9.4	12	1.1	0	152	5.0	.3	1.7	.07	.0	223	116	116	d.8	d.8	390	--	2
Apr. 1-19	4.8	--	2.4	.28	17	5.3	5.3	.9	0	76	2.5	.3	1.0	.04	.0	118	64	64	--	--	210	--	1
Apr. 20-25, 27-29	6.8	5.6	5.1	.18	36	12	17	1.3	0	206	4.0	.5	.3	.02	.0	285	140	140	1.4	1.4	537	3.50	4
May 1-2, 6, 8-9	11	6.3	2.1	.91	63	20	33	1.8	0	350	7.0	.6	.3	.05	--	499	239	239	1.7	1.2	798	--	1
May 10-11, 13-25, 27-28	7.2	--	.08	.21	28	8.7	11	1.1	0	138	5.0	.2	.4	.05	.0	206	106	106	--	--	359	--	1
June 1-3, 5-14	6.0	--	.06	.54	22	6.3	7.6	1.1	0	101	3.0	.2	.1	.03	.0	173	81	81	.5	.4	293	3.95	0
July 3-4, 6-7, 9-23, 25-26	9.2	4.7	1.1	1.8	67	21	38	2.4	0	362	8.0	.6	.3	.23	.0	522	254	254	1.2	1.3	856	--	1
Aug. 1, 4-8, 11-13, 15-	7.7	2.6	.27	.65	56	16	30	2.6	0	278	8.0	.5	.5	.20	.0	394	206	206	.7	.6	668	--	2
Sept. 4-12, 14-17, 21-	6.7	1.6	.37	1.3	41	10	17	1.9	0	185	4.5	.2	.4	.05	.0	293	143	143	.4	1.0	458	--	5
e Time-weighted average	6.6	--	1.6	.76	32	10	16	1.5	0	166	5.3	0.3	0.7	0.10	0.0	241	121	121	--	--	421	--	2

a Collected Oct. 26, 1959.
b Collected Nov. 9, 1959.
c Collected Dec. 28, 1959.
d Collected Mar. 12, 1960.
e Represents 74 percent of the days.

U. S. Department of the Interior – Geological Survey – Water Resources Division
Map No. 58 - Monongahela River at Lock and Dam 8, at Point Marion, Pa
pH of water, water year October 1959 to September 1960

a1698

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.70	3.80	4.5	4.00	3.80	4.7	5.8	3.65	4.8	--	3.45	--
2	3.65	3.75	4.5	4.30	4.10	--	5.5	3.55	4.40	--	--	--
3	3.60	3.75	4.7	4.20	3.90	4.20	5.1	--	4.9	3.45	--	--
4	3.65	3.75	4.5	4.9	3.80	4.20	5.2	--	--	3.35	3.40	3.65
5	3.65	3.70	4.5	4.35	3.90	4.10	4.8	--	4.05	--	--	3.85
6	3.65	3.65	4.6	4.6	3.80	4.00	5.2	3.45	4.20	3.50	3.70	3.75
7	3.65	3.65	4.45	4.45	3.95	3.85	5.1	--	4.25	3.40	3.50	3.95
8	3.70	3.60	4.20	4.20	4.05	--	5.2	3.40	4.35	--	3.50	3.80
9	3.70	3.70	4.25	4.30	4.00	3.70	5.3	3.65	3.85	3.40	--	3.90
10	3.70	3.85	4.35	4.10	4.20	3.60	5.0	4.35	3.85	3.35	--	3.95
11	3.65	3.75	4.45	4.00	4.9	3.65	4.7	3.95	3.70	3.40	3.40	3.80
12	3.70	3.80	--	4.10	5.2	3.50	4.6	--	3.65	3.40	4.25	3.85
13	3.65	4.10	--	4.05	4.7	3.50	4.30	4.30	3.55	3.35	4.40	--
14	3.60	4.05	--	--	4.7	3.65	4.25	4.40	3.55	3.40	--	3.65
15	3.65	--	4.6	3.90	4.7	3.65	4.10	4.7	--	3.30	4.25	4.20
16	3.75	3.75	4.30	4.6	4.25	3.50	3.85	4.7	--	3.30	--	3.95
17	3.60	3.95	4.5	4.8	4.20	--	3.80	4.7	--	3.10	--	4.6
18	3.60	4.10	4.6	4.5	--	--	3.85	4.35	--	3.20	--	--
19	3.75	4.10	4.40	4.45	4.05	--	3.85	4.30	--	3.30	--	--
20	3.70	4.25	4.6	4.20	4.00	--	3.65	4.05	--	3.35	--	--
21	3.70	4.05	4.35	4.5	4.20	3.90	3.75	3.95	--	3.30	--	4.35
22	3.60	4.35	4.15	4.40	--	4.00	3.60	3.90	--	3.30	--	--
23	3.70	4.40	4.20	4.25	4.00	3.90	3.50	4.15	--	3.25	--	--
24	3.60	4.10	4.20	4.05	--	--	3.55	3.95	--	--	--	--
25	3.65	4.05	4.05	4.10	4.20	4.00	3.50	3.85	--	3.30	--	--
26	3.60	4.5	4.10	4.10	4.20	4.05	--	--	--	3.40	--	--
27	3.65	4.6	4.10	3.85	4.15	--	3.40	3.95	--	3.40	--	--
28	3.75	--	3.90	3.90	--	4.15	3.40	3.85	--	3.35	--	--
29	3.65	4.6	4.10	3.80	4.10	4.6	3.30	--	--	--	--	--
30	3.70	--	4.20	3.75	--	--	--	--	--	--	--	--
31	3.70	--	4.15	3.70	--	5.2	--	--	--	--	--	--
Max	3.75	4.6	4.7	4.9	5.2	5.2	5.8	4.7	--	3.50	--	4.6
Min	3.60	3.60	3.90	3.70	3.80	3.50	3.30	3.40	--	3.10	--	3.65

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1961.
Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 444 ppm June 1-4; minimum, 126 ppm Nov. 11-30.
Hardness: Maximum, 215 ppm June 1-4; minimum, 66 ppm Nov. 11-30.
Specific conductance: Maximum daily, 821 micromhos June 2; minimum daily, 125 micromhos June 15.
Water temperatures: Maximum, 80°F Sept. 4; minimum, freezing point on several days during December to February.
EXTREMES, 1955-61.--Dissolved solids: Maximum, 620 ppm Jul, 21-27, 29-31, 1959; mi
Hardness: Maximum, 287 ppm Nov. 7-8, 1959; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,200 micromhos June 19, 1958; minimum daily, 124 micromhos Aug. 7, 1958.
Water temperatures: Maximum, 82°F on several days during July to September 1959; minimum, freezing point on many days during winter months.
REMARKS.--Acidity determined to pH 7.0. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio.
No discharge records available.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics	
																			Calcium, magnesium	Noncarbonate					Phenols as C_6H_5OH	Alkyl benzene sulfonate (ABS)
Oct. 9,10, 15, 1960...		6.5	--	0.40	0.63	22	7.3	12	1.7		0		108	5.0	0.1	0.4	0.40	165	85	85	0.4	288		--		--
Nov. 11-30...		5.8	--	1.3	.41	18	5.0	6.7	1.8		0		78	4.0	.1	.7	.50	126	66	66	.5	211		4		0.1
Dec. 1-31....		6.3	1.3	2.0	.69	27	9.0	14	1.5		0		132	5.0	.2	.5	.10	212	105	105	.5	333		1		.1
Jan. 1-31, 1961........		6.0	1.2	2.1	.25	20	6.1	6.5	1.3		0		89	4.0	.3	1.4	.15	147	75	75	.3	230		1		.0
Feb. 1-28....		6.0	2.7	3.0	.30	27	9.0	9.7	.9		0		132	4.0	.0	.9	.15	203	105	105	.3	326		3		.1
Mar. 1-31....		5.6	1.0	2.1	.33	20	6.5	6.7	1.2		0		96	3.0	.3	.7	.36	144	76	76	.3	246		1		.1
Apr. 1-30....		5.8	1.5	2.1	.68	27	8.5	9.4	1.1		0		127	2.0	.1	.4	.50	185	103	103	.2	315		2		.0
May 1-19.....		5.2	--	2.0	.16	20	6.7	7.5	1.0		0		97	2.0	.2	.3	.10	144	78	78	--	252		7		.0
May 20-23....		6.3	--	3.2	.56	31	11	15	1.4		0		172	3.5	.2	.2	.20	246	123	123	--	445		3		.0
May 24-31....		7.8	4.4	4.3	.97	48	16	24	1.4		0		265	5.0	.2	.4	.30	376	186	186	1.0	640		2		.0
June 1-4.....		8.4	4.8	2.3	1.5	58	17	29	2.0		0		312	5.0	.4	.3	.20	444	215	215	1.0	720		3		--
June 5-30....		6.0	1.0	.92	.62	24	6.4	9.1	1.2		0		116	2.0	.2	.2	.10	170	86	86	--	302		3		.0
July 1-21....		7.9	3.0	1.0	1.1	47	14	24	1.9		0		240	6.0	.4	.4	.10	335	175	175	.6	565		5		.0
July 22-28...		6.1	--	.58	.54	25	7.4	10	1.6		0		120	4.0	.2	.8	.13	171	93	93	.3	308		5		.0
Aug. 8-31....		6.4	1.3	.56	.70	25	6.9	11	1.9		0		122	3.0	.2	.8	.06	175	91	91	.3	311		5		.0
Sept. 1-30...		8.1	3.8	1.1	.32	45	14	28	2.2		0		262	6.5	.3	.2	.10	359	170	170	.8	653		3		.0

U. S. Department of the Interior – Geological Survey – Water Resources Division
Map No. 58 - Monongahela River at Lock and Dam 8, at Point Marion, Pa.
pH of water, water year October 1960 to September 1961

a1686

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	--	--	4.10	5.8	4.25	4.6	4.20	4.15	4.10	3.65	--	3.60
2	--	--	4.10	5.4	3.90	4.8	4.30	4.20	3.80	3.85	--	3.50
3	--	--	4.20	5.1	3.90	4.7	4.5	4.20	4.10	4.00	--	3.55
4	--	--	3.90	5.7	3.80	--	4.6	4.10	3.90	3.75	--	3.55
5	--	--	4.20	5.0	3.90	4.4	4.5	4.15	4.40	3.90	--	3.60
6	--	--	4.10	5.0	3.90	4.4	4.30	4.20	4.10	4.00	--	3.55
7	--	--	4.00	4.7	--	4.6	4.30	4.05	4.20	3.70	--	3.65
8	--	--	4.10	4.45	3.80	4.5	4.30	4.00	4.30	3.80	4.30	3.30
9	4.00	--	3.85	4.5	3.60	4.5	4.15	4.20	4.20	3.70	4.45	3.45
10	4.20	--	4.20	4.7	3.80	4.4	3.95	4.6	--	3.75	4.25	3.45
11	--	4.7	--	4.5	3.80	4.4	4.05	4.7	5.1	--	4.20	3.40
12	--	5.5	4.30	4.7	3.80	--	4.05	4.5	5.1	3.70	4.5	3.50
13	--	5.1	4.30	4.5	3.85	4.3	4.10	4.5	5.2	3.40	5.7	3.50
14	--	5.5	4.10	4.35	4.5	4.2	4.6	4.25	5.0	3.40	5.7	3.45
15	3.90	5.3	4.10	4.30	5.1	4.1	4.7	3.95	5.1	--	4.9	3.35
16	--	5.3	4.10	4.30	5.2	4.3	4.6	3.75	5.2	3.65	4.7	3.35
17	--	5.5	4.10	4.30	5.1	4.2	4.45	3.75	4.7	3.50	4.9	3.35
18	--	4.5	3.85	4.45	4.9	4.1	4.6	4.00	4.9	3.60	4.9	--
19	--	4.40	4.05	4.5	5.7	3.90	4.6	3.90	4.40	3.90	4.6	3.45
20	--	4.30	4.05	4.6	4.9	3.90	4.7	3.65	4.30	4.20	4.15	3.35
21	--	4.5	--	4.8	4.5	3.90	4.5	3.60	4.20	4.40	4.00	3.40
22	--	4.40	4.20	4.5	4.45	4.4	4.45	3.65	4.10	4.5	3.90	3.60
23	--	4.5	4.30	4.6	4.5	4.5	4.45	3.60	4.30	4.30	4.05	3.60
24	--	4.00	4.30	4.6	4.40	4.5	4.40	3.45	4.30	4.20	4.15	3.50
25	--	4.40	--	4.20	4.15	4.2	4.5	3.50	4.40	4.20	3.90	3.35
26	--	4.20	4.20	4.35	4.6	4.1	4.6	3.55	4.30	4.15	3.85	3.40
27	--	--	4.20	4.40	4.8	4.1	4.7	3.55	4.10	4.05	3.75	3.40
28	--	4.30	4.6	4.25	5.1	4.0	4.7	3.45	4.00	3.90	3.80	3.35
29	--	4.30	4.8	4.20	--	3.90	4.8	3.45	4.10	--	3.90	3.35
30	--	3.90	5.5	4.20	--	4.0	4.5	3.50	4.10	--	3.55	3.50
31	--	--	5.7	4.10	--	4.1	--	3.40	--	--	3.65	--
Max	--	5.5	5.7	5.8	5.7	4.8	4.8	4.7	5.2	4.5	5.7	3.65
Min	--	3.90	3.85	4.10	3.60	3.90	3.95	3.40	3.80	3.40	3.55	3.30

58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PA.

LOCATION.--About 750 feet upstream from dam, lock and dam 8 (mile 90.8) at Point Marion, Fayette County, and 1.5 miles upstream from Cheat River.
DRAINAGE AREA.--2,720 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1962.
Water temperatures: October 1955 to September 1962.
EXTREMES, 1961-62.--Dissolved solids: Maximum, 588 ppm June 1-18; minimum, 141 ppm Dec. 1-31.
Hardness: Maximum, 274 ppm June 1-18; minimum, 64 ppm June 19-30.
Specific conductance: Maximum daily, 1,240 micromhos June 12; minimum daily, 124 micromhos Jan. 11, 12.
Water temperatures: Maximum, 80°F July 12, 14, 22, Aug. 20; minimum, freezing point Jan. 24, Feb. 10.
EXTREMES, 1955-62.--Dissolved solids: Maximum, 620 ppm July 21-27, 29-31, 1959; minimum, 100 ppm Aug. 2-7, 9-10, 1958.
Hardness: Maximum, 287 ppm Nov. 7-8, 1959; minimum, 54 ppm June 1-10, 1956.
Specific conductance: Maximum daily, 1,240 micromhos June 12, 1962; minimum daily, 124 micromhos Aug. 7, 1958, Jan. 11, 12, 1962.
Water temperatures: Maximum, 82°F on several days during July to September 1959; minimum, freezing point on many days during winter months.
REMARKS.--Acidity determined to pH 7.0. Records of specific conductance and pH of daily samples available in district office at Columbus, Ohio.
No discharge records available.

Chemical analyses, in parts per million, water year October 1961 to September 1962

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Lithium (Li)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphorus as PO_4	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color	Organics	
																			Calcium, magnesium	Noncarbonate					Phenols as C_6H_5OH	Alkyl benzene sulfonate (ABS)
Oct. 1-31, 1961		6.7	2.5	1.4	0.23	42	13	22	2.3		0		219	6.5	0.3	0.4	0.16	307	159	159	0.6	537		3		0.0
Nov. 2-30		5.4	.4	.79	.65	23	6.1	10	1.6		0		103	4.0	.2	.9	.06	159	82	82	.1	253		3		.0
Dec. 1-31		5.5	.5	.93	.52	24	4.3	7.6	1.3		1		92	4.0	.2	1.1	.08	141	78	76	.1	233		3		.1
Jan. 1-31, 1962		5.7	.9	2.7	.51	22	6.7	7.6	1.3		0		99	3.0	.3	1.0	.17	154	82	82	.2	260		3		.0
Feb. 1-27		6.0	.9	2.5	.53	25	7.2	9.4	1.1		0		115	4.0	.3	.9	.24	175	92	92	.2	290		2		.0
Mar. 1-31		5.5	1.9	2.1	.23	20	7.0	6.7	1.0		0		100	2.5	.1	.8	.09	146	79	79	.4	247		2		.0
Apr. 1-30		6.5	2.4	2.6	.46	30	8.9	11	.9		0		138	4.0	.1	1.0	.04	205	112	112	.4	354		2		.0
May 1-9		7.7	--	3.8	.87	40	13	18	1.5		0		221	3.0	.1	.4	.04	322	154	154	.8	559		2		.0
May 10-31		9.9	8.7	3.9	1.6	68	23	37	2.0		0		415	6.0	.2	.2	.04	576	264	264	1.8	989		4		.0
June 1-18		8.7	6.6	2.1	1.7	75	21	43	2.3		0		418	7.5	.2	.2	.08	588	274	274	1.4	976		4		.0
June 19-30		5.0	--	.56	.40	17	5.2	7.8	1.2		0		95	2.0	.1	.1	.04	142	64	64	.4	298		3		.0
July 1-31		7.1	5.4	1.4	1.1	36	12	22	1.6		0		236	7.2	.3	.2	.13	339	140	140	1.6	667		2		.0
Aug. 1-31		8.1	5.6	1.7	2.0	54	18	39	2.5		0		346	8.5	.5	.3	.05	505	209	209	1.5	869		1		.0
Sept. 1-30		7.6	5.5	2.1	1.6	50	15	33	2.2		0		308	8.0	.6	.2	.06	424	187	187	1.9	797		2		.0
Time-weighted average		6.7	3.2	2.0	.87	37	11	19	1.6		0		201	5.2	0.3	0.6	0.10	290	137	137	0.8	509		3		0.0

U. S. Department of the Interior – Geological Survey – Water Resources Division
Map No. 58 - Monongahela River at Lock and Dam 8, at Point Marion, Pa.
pH of water, water year October 1961 to September 1962

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Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.60	--	5.5	4.15	4.40	5.2	4.00	3.80	3.25	3.65	--	3.20
2	3.65	4.10	4.8	3.90	4.30	4.45	3.90	3.90	3.30	3.50	3.30	3.20
3	3.65	4.20	4.8	4.00	4.25	4.35	4.00	3.80	3.35	3.55	3.35	3.15
4	3.50	4.00	4.6	3.90	4.00	4.35	3.95	3.80	3.25	--	3.35	3.20
5	3.50	4.20	4.00	4.00	4.10	4.25	4.00	3.60	3.20	3.45	3.20	3.20
6	3.60	4.00	4.20	4.10	4.40	--	3.95	3.65	3.15	3.40	--	3.20
7	3.80	4.20	4.00	4.5	4.25	3.95	3.90	3.60	3.45	3.35	3.35	--
8	3.70	4.10	4.10	5.9	4.5	3.85	3.95	3.65	3.60	3.35	3.45	3.25
9	3.70	4.10	3.80	5.7	4.30	3.70	4.7	3.60	3.45	3.45	3.35	3.20
10	3.45	4.5	4.10	4.9	4.35	3.75	5.6	3.35	3.40	3.40	3.30	3.35
11	--	4.5	3.95	4.8	4.30	3.80	4.5	3.35	3.40	--	3.35	3.40
12	3.60	4.00	--	4.7	4.00	4.25	4.7	3.30	3.15	3.40	3.35	3.50
13	3.60	4.20	4.10	4.8	4.10	4.6	4.40	3.30	3.35	3.35	3.30	--
14	3.70	--	4.20	4.40	4.05	4.5	4.8	3.30	3.40	3.35	3.35	3.40
15	3.55	4.05	6.1	4.00	4.10	4.40	5.5	3.30	3.60	3.40	3.35	3.35
16	3.65	4.00	5.3	4.00	4.20	4.25	5.3	--	--	3.45	3.40	3.35
17	3.75	4.20	4.7	4.10	4.20	4.20	4.7	3.30	3.70	3.35	3.30	3.40
18	--	4.6	5.2	4.00	4.20	4.10	4.5	3.30	3.85	3.25	3.25	3.40
19	3.75	4.8	6.5	3.85	--	4.00	4.45	3.30	3.80	3.35	3.25	3.35
20	3.70	4.9	6.5	3.90	4.20	3.80	4.30	3.30	3.80	3.45	3.35	3.30
21	3.70	4.9	6.3	3.90	4.10	3.80	4.30	3.30	3.90	3.50	3.35	3.25
22	3.80	4.15	6.0	3.85	4.20	3.85	4.20	--	3.95	3.50	3.45	3.20
23	--	4.6	6.0	4.25	4.30	5.1	4.25	3.30	4.00	3.50	3.40	3.15
24	3.75	4.20	5.0	4.6	4.35	4.5	4.30	3.30	--	3.50	3.30	3.25
25	3.75	6.0	4.6	5.2	5.9	4.45	4.15	3.25	3.85	3.50	3.25	3.25
26	3.80	6.3	4.6	4.6	6.1	4.45	4.05	3.20	3.80	3.50	3.45	3.25
27	3.90	6.0	4.30	4.6	5.9	4.25	4.20	3.20	3.75	3.35	3.40	3.35
28	--	5.3	4.15	4.30	--	4.10	4.10	3.15	3.75	3.35	3.35	3.35
29	4.10	5.3	4.25	4.6	--	4.00	3.95	3.20	3.70	3.45	3.30	3.35
30	3.80	5.0	4.35	--	--	3.80	3.90	3.20	3.65	3.40	3.30	3.30
31	3.90	--	4.20	4.40	--	3.55	--	3.20	--	3.35	3.25	--
Max	4.10	6.3	6.5	5.9	6.1	5.2	5.6	3.90	4.00	3.65	3.45	3.50
Min	3.45	4.00	3.80	3.85	4.00	3.55	3.90	3.15	3.15	3.25	3.20	3.15

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Map no. 58

Monongahela River at Lock and Dam 8, at Point Marion, Pennsylvania
Sampling frequency: Daily
Analyses: 1. Daily sample having maximum specific conductance for month
2. Daily sample having minimum specific conductance for month
3. Monthly composite of daily samples
Period: October 1, 1962 - June 30, 1963

Month	Day	Sp. Conductance Max.	Sp. Conductance Min.	Sp. Conductance Monthly Comp.	pH	Hardness as CaCO$_3$	HCO$_3$ Alk.	Sulfate (SO$_4$)	Chloride (Cl)	Fluoride (F)	Nitrate (NO$_3$)	Diss. solids	Iron (Fe)	Manganese (Mn)
Oct.	3	892			3.40	244	0	376	8.0	0.4	0.8	532		
	28-29		278		3.90	72	0	99	2.0	.0	.4	150		
				604		166	0	243	6.0	.2	.4	351	1.3	1.4
Nov.	3	512			4.15	206	0	220	11	.1	1.0	334		
	27		106		5.2	35	4	37	2.3	.0	1.5	69		
				154		65	6	71	5.0	.1	1.5	120	1.1	.36
Dec.	19	498			3.65	141	0	192	9.0	.0	1.6	302		
	27		147		5.0	49	2	52	3.0	.0	2.1	110		
				299		90	0	108	5.0	.0	1.2	175	1.3	.60
Jan.	28	416			3.80	134	0	172	8.0	.0	.7	268		
	17		128		5.0	44	4	45	5.0	.0	1.9	86		
				247		76	0	93	4.0	.0	1.0	148	.97	.43
Feb.	3	459			4.00	146	0	182	6.0	.2	.8	272		
	7		160		4.6	53	0	58	3.0	.1	1.4	102		
				288		101	0	112	5.0	.2	1.1	179	2.6	.28
March	19	385			4.10	130	0	161	4.0	0.3	0.6	223		
	17		189		4.5	58	0	57	2.0	.2	.6	103		
				241		78	0	95	2.5	.3	.6	131	1.7	0.38
April	27	1,140			3.40	376	0	508	5.0	.6	.5	456		
	2		200		4.10	79	0	104	2.0	.2	.5	150		
				750		221	0	307	3.0	.5	.4	446	5.3	.44
May	17	801			3.50	221	0	324	4.0	.4	.1	456		
	25		274		3.95	69	0	90	2.0	.4	.2	124		
				598		168	0	230	4.0	.4	.2	331	2.9	1.1
June	30	510			3.70	146	0	185	3.0	.3	.9	290		
	9		160		5.2	54	2	58	4.0	.2	1.1	92		
				337		100	0	120	6.5	.3	.9	189	1.0	.68

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Map no. 58

Monongahela River at Lock and Dam 8, at Point Marion, Pennsylvania
Sampling frequency: Daily
Analyses: Iron, manganese, and acidity--determined on daily sample showing minimum pH value for each month.
Period: October 1962 - June, 1963

Date	pH	Iron (Fe)	Manganese (Mn)	Acidity (H+)	
				Immediate	Potential Free
Oct. 5, 1962	3.20	2.2	1.4	1.6	1.6
Nov. 11, 1962	4.25	1.1	.26	.3	.2
Dec. 18, 1962	3.65	4.4	.71	.1	.6
Jan. 11, 1963	3.75	2.5	.36	.1	.4
Feb. 19, 1963	3.90	3.0	.38	.4	.4
Mar. 13, 1963	3.80	4.3	.88	.8	.8
April 24, 1963	3.50	9.6	2.3	1.4	1.3
May 15, 1963	3.45	5.6	1.5	1.8	1.5
June 4, 1963	3.55	3.1	.58	1.4	1.0

U. S. Department of the Interior – Geological Survey – Water Resources Division
Map No. 58 - Monongahela River at Lock and Dam 8, at Point Marion, Pa.
pH of water, water year October 1962 to September 1963

[illegible]

Day	October	November	December	January	February	March	April	May	June	July	August	September
1	3.40	5.8	4.8	--	4.00	4.10	--	3.60	4.15			
2	3.35	5.4	4.45	--	4.10	4.10	4.10	3.60	3.85			
3	3.35	4.6	4.25	5.0	4.00	4.7	3.85	3.65	3.65			
4	3.30	4.30	3.95	4.5	4.5	5.2	3.85	3.60	3.55			
5	3.20	4.45	4.10	4.5	5.1	4.7	3.80	3.60	3.75			
6	3.30	4.7	4.10	4.35	4.7	--	3.70	3.60	4.5			
7	3.45	4.7	3.85	4.00	4.5	4.40	3.65	--	5.0			
8	3.40	4.6	3.85	3.95	4.7	4.20	3.65	3.60	5.3			
9	3.40	4.6	--	4.05	4.6	4.20	--	3.60	5.2			
10	3.35	4.40	3.85	4.10	4.20	4.20	3.65	3.65	4.7			
11	3.45	4.25	3.80	3.75	4.20	4.20	3.55	3.70	5.4			
12	3.95	--	3.85	3.90	4.40	4.20	3.55	3.60	5.9			
13	3.85	4.30	3.85	4.30	4.30	3.80	3.55	3.60	5.5			
14	3.80	5.3	3.75	4.6	4.20	4.40	3.55	3.60	4.9			
15	3.60	5.1	4.00	4.7	4.5	4.40	3.50	3.45	4.6			
16	3.50	5.1	3.90	4.9	4.30	4.30	3.45	3.55	4.5			
17	3.60	--	--	5.0	4.30	4.5	3.40	3.50	4.15			
18	3.65	4.6	3.65	5.0	4.30	4.40	3.40	3.55	4.30			
19	3.75	4.6	3.65	4.7	3.90	4.10	3.40	3.55	4.35			
20	--	5.2	4.10	4.5	4.20	4.6	3.40	3.60	4.30			
21	3.85	5.1	4.05	4.30	5.2	5.0	3.45	--	4.10			
22	3.85	5.0	4.05	4.35	4.5	4.5	3.45	3.80	3.95			
23	--	5.8	5.1	4.40	4.10	4.5	--	4.00	3.70			
24	3.70	5.7	4.9	4.25	4.20	4.30	3.40	4.00	3.90			
25	3.80	5.6	4.7	4.20	4.30	4.30	3.40	3.95	3.80			
26	3.90	5.2	5.0	4.10	4.20	4.40	3.45	3.90	3.75			
27	3.95	5.4	5.0	4.05	4.10	4.40	3.40	3.70	3.70			
28	3.90	--	4.8	3.80	4.00	4.30	3.45	3.75	3.70			
29	3.90	5.1	--	3.80	--	4.30	3.55	3.75	3.80			
30	3.90	4.5	--	3.85	--	4.20	3.50	3.80	3.70			
31	3.80	--	--	3.90	--	4.20	--	3.70	--			
Max	3.95	5.8	5.1	5.0	5.2	5.2	4.10	4.00	5.9			
Min	3.20	4.25	3.65	3.75	3.90	3.80	3.40	3.45	3.55			

MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1944 to September 1945

Date of collection	Mean discharge (second-feet)	Temperature (° F.)	Color	pH	Specific conductance (k × 10⁵ at 25° C.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Noncarbonate	
Oct. 1-10, 1944	5,961	66	5	3.50	54.1	7.0	4.6	0.11	1.2	34	11	20	4.3	0	217	8.5	0.2	0.6	342	166	166	46
Oct. 11-20	3,370	60	5	4.00	36.1	6.0	1.1	.15	.7	26	7.9	17	2.9	0	141	5.6	.1	.8	211	110	110	24
Oct. 21-31	14,240	52	3	4.30	22.8	4.8	1.0	.01	.6	18	5.5	8.5	2.7	0	88	4.0	.1	1.9	136	76	76	21
Nov. 1-10	2,235	51	5	4.30	31.8	5.0	2.2	.03	.6	22	7.4	16	1.9	0	120	4.2	.1	1.0	187	101	101	20
Nov. 11-20	2,845	48	5	3.70	42.4	5.8	4.0	.05	.8	26	9.5	19	1.8	0	158	4.9	.2	.8	235	138	138	39
Nov. 21-30	8,391	44	5	3.80	38.3	5.6	3.2	.05	.8	25	8.3	16	1.7	0	143	4.6	.2	.6	210	124	124	29
Dec. 1-10	10,320	38	6	4.8	20.7	4.4	.6	.03	3	17	5.1	9.7	1.5	1	79	3.9	.1	1.0	126	67	67	8
Dec. 11-20	9,739	33	5	5.1	18.9	5.6	.8	.04	.4	17	5.7	9.6	1.6	6	73	3.0	.2	.9	123	71	66	5
Dec. 21-31	33,520	35	2	4.40	20.1	5.3	1.1	.03	.2	16	5.1	8.5	1.6	0	76	3.4	.1	2.2	124	68	65	15
Jan. 1-10, 1945	33,970	36	3	4.10	19.6	5.0	1.7	.03	.2	14	4.8	6.1	1.2	0	72	1.9	.0	2.0	112	69	69	21
Jan. 11-20	12,940	34	4	3.75	30.8	6.2	3.2	.09	.1	21	7.2	11	1.2	0	114	2.5	.1	1.9	174	109	109	32
Jan. 21-31	7,409	33	4	3.55	39.3	6.8	3.4	.11	.6	24	9.2	15	1.2	0	144	3.0	.1	2.0	208	134	134	43
Feb. 1-10	6,608	32	2	3.50	46.1	6.2	3.7	.11	.6	28	9.7	13	2.3	0	162	4.2	.4	1.8	240	148	148	47
Feb. 11-20	22,930	37	2	4.20	20.0	4.9	.8	.02	.3	16	4.8	6.8	1.0	0	72	2.8	.4	2.8	115	68	68	13
Feb. 21-28	36,300	40	2	4.35	18.3	4.5	.7	.03	.2	16	4.9	5.4	.8	0	65	2.2	.3	2.6	108	66	66	11
Mar. 1-10	53,850	44	2	4.35	18.1	4.5	1.2	.02	.3	16	4.5	4.7	1.2	0	67	2.0	.3	1.9	107	68	68	11
Mar. 11-20	15,250	48	3	3.65	33.8	5.2	3.3	.06	.5	21	7.1	10	1.0	0	117	3.8	.4	1.4	174	114	114	36
Mar. 21-31	18,990	51	2	3.90	28.5	5.6	2.3	.04	.4	20	6.4	11	.8	0	102	6.0	.3	1.2	161	96	96	24
Apr. 1-10	10,310	56	6	3.80	35.1	5.2	2.1	.03	.4	22	8.0	11	1.8	0	121	4.0	.2	1.6	190	108	108	36
Apr. 11-20	8,004	59	6	3.80	40.9	5.4	2.3	.03	.5	28	9.4	14	1.9	0	150	4.8	.2	1.4	234	130	130	39
Apr. 21-30	8,897	59	6	4.00	33.6	5.0	2.4	.02	.3	24	7.9	13	1.6	0	126	3.8	.2	1.0	200	111	111	25
May 1-10	8,164	57	6	3.90	38.2	5.6	2.6	.02	.3	24	8.7	18	1.8	0	134	12	.2	.8	220	117	117	32
May 11-20	19,420	59	4	4.8	20.6	5.0	1.2	.02	.3	17	5.2	7.9	1.4	2	75	4.0	.2	1.2	124	71	69	6
May 21-31	6,809	64	7	3.90	34.6	5.0	2.2	.05	.3	22	7.6	15	1.6	0	122	5.8	.1	1.0	194	105	105	28
June 1-10	4,099	64	3	3.60	43.4	4.4	3.6	.05	.8	26	10	18	1.8	0	153	6.1	.2	1.8	227	140	140	38
June 11-20	9,796	69	3	3.80	36.2	5.4	2.3	.04	.8	24	8.7	13	1.8	0	126	3.9	.2	2.1	194	118	118	27
June 21-30	4,101	74	2	3.90	36.6	5.2	2.4	.05	.4	24	8.7	16	1.8	0	134	4.5	.2	1.0	204	116	116	28
July 1-10	1,834	78	4	3.50	57.4	6.4	4.3	.26	.9	33	13	25	1.9	0	211	7.1	.1	.8	316	178	178	51
July 11-20	1,513	76	4	3.40	69.2	6.4	5.5	.35	1.0	40	14	33	2.7	0	260	8.5	.3	.8	380	212	212	61
July 21-31	3,492	78	3	3.30	77.3	6.4	7.2	.29	1.0	40	15	32	3.0	0	280	7.5	.3	1.0	404	231	231	83
Aug. 1-10	6,684	77	2	3.70	43.1	5.8	2.6	.10	.8	28	9.4	20	1.7	0	157	6.0	.4	1.0	239	135	135	29
Aug. 11-20	1,738	76	7	3.70	40.3	2.8	1.8	.11	.5	25	8.5	17	2.4	0	141	5.0	.2	1.0	215	119	119	32
Aug. 21-31	6,226	74	6	3.90	43.2	4.4	1.4	.07	.7	27	8.9	20	2.5	0	145	7.6	.2	1.4	232	119	119	32
Sept. 1-10	4,125	74	6	3.90	32.1	4.8	.8	.09	.4	20	6.0	15	2.2	0	104	10	.1	.9	171	86	86	24
Sept. 11-20	14,910	70	7	3.90	32.7	5.2	1.6	.12	.6	24	7.3	12	2.1	0	118	4.8	.1	.9	185	106	106	22
Sept. 21-30	20,860	65	6	5.7	18.7	5.8	.4	.02	.2	19	5.0	5.4	1.8	3	75	2.8	.1	1.4	117	71	68	------
Average	12,100	56	4	3.95	35.4	5.4	2.4	0.08	0.5	23	7.9	14	1.8	0	129	5.0	0.2	1.3	199	109	109	30

Chemical analyses, in parts per million, water year October 1945 to September 1946

Date of collection	Mean discharge (second-feet)	Temperature (° F.)	Color	pH	Specific conductance (K×10⁶ at 25° C.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Noncarbonate	
Oct. 1-10, 1945	5,523	61	3	4.40	32.3	6.0	2.3	0.03	0.50	26	8.6	12	2.8	0	127	4.0	0.2	1.0	206	115	115	21
Oct. 11-20	5,047	56	1	3.90	43.0	6.2	3.2	.09	.50	29	9.7	16	3.0	0	161	5.0	.2	.8	248	139	139	37
Oct. 21-31	2,025	55	3	3.75	53.3	5.8	3.6	.20	.45	35	13	24	3.3	0	206	7.0	.2	.7	319	171	171	39
Nov. 1-10	4,585	53	1	3.70	50.6	6.0	3.9	.21	.30	30	11	22	3.2	0	186	8.0	.2	.7	289	153	153	42
Nov. 11-20	15,520	49	1	4.40	30.1	4.4	1.3	.05	.30	24	7.6	13	3.4	0	116	6.0	.1	1.0	190	100	100	14
Nov. 21-30	21,360	43	5	4.6	16.3	4.7	.6	.03	.08	14	4.4	6.7	2.2	1	60	2.9	.1	1.9	100	57	56	8
Dec. 1-10	17,030	39	2	4.45	19.6	5.2	.6	.05	.25	16	4.9	8.1	2.2	0	72	2.5	.2	1.6	122	65	65	14
Dec. 11-20	7,419	34	3	4.20	24.4	4.8	1.2	.03	.30	18	6.0	11	2.3	0	91	3.9	.2	1.7	146	80	80	20
Dec. 21-31	9,551	33	3	4.05	32.0	5.2	2.0	.06	.35	23	9.1	15	2.1	0	120	5.1	.2	1.8	192	111	111	25
Jan. 1-10, 1946	20,450	36	2	4.5	20.3	4.7	.7	.04	.15	17	5.2	7.3	1.6	1	73	3.2	.1	1.8	126	68	67	13
Jan. 11-20	13,310	40	9	4.5	20.9	3.6	1.2	.04	.30	17	5.3	6.5	1.6	0	79	2.0	.1	1.8	124	72	72	14
Jan. 21-31	3,135	36	5	3.90	39.0	6.0	2.9	.06	.39	26	8.6	16	1.8	0	148	4.6	.1	1.9	219	123	123	32
Feb. 1-10	9,423	35	4	3.80	43.3	5.4	3.2	.10	.58	28	8.9	17	1.8	0	160	4.4	.1	1.7	235	134	134	38
Feb. 11-20	17,030	36	5	4.6	17.0	4.0	.5	.03	.25	14	4.0	6.7	1.2	1	65	2.8	.1	1.9	99	55	54	9
Feb. 21-28	11,760	36	3	4.6	20.7	5.1	.2	.04	.00	18	4.9	8.4	.8	1	78	3.0	.1	2.0	128	66	65	8
Mar. 1-10	11,440	41	3	4.30	23.4	5.5	.6	.02	.11	18	5.4	9.2	.9	0	89	2.2	.1	1.6	143	73	73	12
Mar. 11-20	13,700	46	4	4.8	21.8	5.3	.3	.03	.18	19	5.5	8.8	1.2	3	84	3.2	.1	1.6	138	72	70	10
Mar. 21-31	12,200	51	6	4.5	23.9	5.7	.7	.03	.28	20	5.9	9.2	.9	0	94	3.2	.1	1.4	148	79	79	11
Apr. 1-10	8,122	52	5	4.7	25.7	5.8	.4	.03	.35	22	6.6	11	1.1	2	104	3.2	.1	1.2	168	85	83	14
Apr. 11-20	3,444	52	3	4.00	39.3	5.2	2.2	.04	.40	31	9.1	18	1.5	0	155	9.2	.1	1.3	241	133	133	28
Apr. 21-30	2,793	55	3	3.80	47.9	6.4	3.3	.04	.65	34	10	22	1.4	0	191	5.5	.2	1.2	285	154	154	39
May 1-10	6,592	56	2	3.70	43.8	6.0	3.0	.07	.40	29	8.0	16	2.8	0	162	4.6	.1	.9	232	133	133	30
May 11-20	17,210	58	2	4.15	30.9	5.0	1.3	.22	.25	25	6.5	13	1.6	0	116	5.2	.1	1.1	183	100	100	18
May 21-31	11,160	63	1	4.30	23.1	5.6	1.2	.03	.25	18	5.6	8.2	1.2	0	86	2.2	.1	1.6	140	77	77	19
June 1-10	17,920	64	1	4.5	25.8	6.3	1.5	.03	.40	22	6.8	8.4	1.3	0	102	2.5	.1	2.3	165	92	92	14
June 11-20	9,515	70	4	4.10	35.5	6.6	2.7	.07	.59	27	8.4	13	1.5	0	141	3.5	.2	1.6	221	122	122	26
June 21-30	9,840	72	1	4.9	24.7	5.7	.7	.02	.29	22	6.4	9.8	1.5	3	99	3.1	.1	1.1	162	86	83	10
July 1-10	3,498	75	5	4.00	35.0	6.2	2.0	.04	.31	25	8.3	14	3.3	0	136	3.0	.3	2.6	212	113	113	28
July 11-20	3,138	77	3	3.70	42.9	6.8	3.1	.09	.30	27	9.0	15	3.0	0	162	2.5	.2	1.6	237	133	133	42
July 21-31	1,438	77	3	3.60	64.3	8.0	3.9	.11	.75	44	15	26	3.3	0	269	5.8	.3	1.6	399	207	207	49
Aug. 1-10	1,876	77	9	3.50	69.9	8.0	4.9	.23	1.0	46	16	37		0	281	8.4	.3	2.0	426	226	226	66
Aug. 11-20	1,121	77	2	3.45	63.9	8.2	5.0	.10	1.1	38	13	30	1.7	0	244	7.5	.2	1.8	358	197	197	68
Aug. 21-31	970	74	2	3.35	88.0	10	6.7	.14	1.3	54	20	44	3.1	0	350	12	.3	1.0	522	281	281	86
Sept. 1-10	552	72	2	3.40	91.9	11	6.6	.21	1.2	59	22	56	4.5	0	385	16	.3	1.2	582	298	298	84
Sept. 11-20	603	72	2	3.20	121	11	8.7	.31	1.5	77	29	73	4.5	0	514	16	.3	1.0	749	399	399	120
Sept. 21-30	710	70	2	3.20	117	10	7.4	.46	1.5	71	27	71	5.1	0	486	16	.3	.6	712	369	369	120
Average	8,294	55	3	------	42.3	6.3	2.6	0.10	0.49	30	9.9	20	2.2	-------	166	5.5	0.2	1.5	255	-----	-----	34

106 MONONGAHELA RIVER AT CHARLEROI, PA.

LOCATION.--At Mercantile Bridge Co. toll bridge, approximately one mile downstream from lock 4, Washington County.
DRAINAGE AREA.--5,213 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1944 to September 1947.
Water temperatures: October 1944 to September 1947.
EXTREMES, 1946-47.--Dissolved solids: Maximum, 682 parts per million Oct. 11-20; minimum, 101 parts per million Apr. 1-10.
Total hardness: Maximum, 356 parts per million Oct. 11-20; minimum, 52 parts per million Apr. 1-10.
Water temperatures: Maximum, 81° F. Aug. 19-20; minimum, freezing point on several days in February and March.
EXTREMES, 1944-47.--Dissolved solids: Maximum, 749 parts per million Sept. 11-20, 1946; minimum, 99 parts per million Feb. 11-20, 1946.
Total hardness: Maximum, 399 parts per million Sept. 11-20, 1946; minimum, 52 parts per million Apr. 1-10, 1947.
Water temperatures: Maximum, 81° F. Aug. 19-20, 1947; minimum, freezing point on many days in December, January, and February each year.
REMARKS.--Records of water discharge for water year October 1946 to September 1947 given in Water-Supply Paper 1083. Records of specific conductance and pH of daily samples available in district office at Washington, D. C.

Chemical analyses, in parts per million, water year October 1946 to September 1947

Date of collection	Mean discharge (second-feet)	Temperature (° F.)	Color	pH	Specific conductance (K×10⁶ at 25° C.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																			Total	Noncarbonate	
Oct. 1-10, 1946	553	64	6	3.25	109	10	8.3	0.29	2.0	64	23	67	0	433	20	0.6	0.8	644	336	336	104
Oct. 11-20	700	61	5	3.25	112	12	9.3	.33	2.4	66	25	68	0	460	16	.6	.6	682	356	356	110
Oct. 21-31	1,656	59	6	3.25	110	12	9.4	.23	2.5	67	24	66	0	456	16	.4	.6	674	355	355	104
Nov. 1-10	1,270	58	5	3.20	101	10	8.4	.33	1.7	57	20	55	0	394	14	.4	.6	568	311	311	110
Nov. 11-20	1,188	50	5	3.40	82.4	8.8	5.6	.19	1.6	49	17	51	0	329	10	.4	.7	484	248	248	70
Nov. 21-30	1,818	46	2	3.60	81.0	8.2	4.8	.08	1.1	53	16	59	0	328	18	--	1.0	494	239	239	56
Dec. 1-10	1,798	44	2	3.55	78.7	7.6	4.8	.11	1.3	53	17	44	0	300	20	--	1.7	466	246	246	62
Dec. 11-20	4,710	44	2	3.70	48.6	5.2	2.3	.06	.75	35	10	21	0	172	12	--	4.2	273	153	153	33
Dec. 21-31	8,386	42	3	4.10	31.5	5.2	1.0	.03	.45	22	6.8	17	0	103	14	--	3.3	179	93	93	18
Jan. 1-10, 1947	13,800	40	3	4.7	19.0	4.8	.4	.03	.13	16	4.4	9.1	3	64	6.0	--	3.5	113	61	58	11
Jan. 13-15, 18	12,310	40	2	4.40	51.4	5.5	1.0	.05	.23	19	6.1	62	0	79	92	--	3.1	272	80	80	11
Jan. 11-12, 16-17, 19-20	17,020	42	2	4.40	23.3	5.8	.8	.04	.22	20	5.4	7.6	0	72	12	--	3.4	133	78	78	11
Jan. 21-31	18,930	40	1	4.30	19.8	4.8	1.0	.03	.20	15	4.6	6.4	0	63	7.2	--	3.2	110	64	64	14
Feb. 1	17,200	--	--	4.6	53.7	--	--	--	--	--	--	--	--	99	--	--	--	--	--	--	20
Feb. 2-10	7,839	37	2	4.10	29.1	5.8	2.3	.03	.21	20	5.9	13	0	68	19	--	2.9	165	93	93	17
Feb. 11-20	4,951	33	3	3.75	36.1	6.2	4.4	.35	.35	24	7.8	5.1	0	128	2.6	--	3.0	201	128	128	32
Feb. 21-28	3,315	32	1	3.60	48.3	7.4	5.9	.06	.47	33	10	9.8	0	176	3.6	--	3.0	272	170	170	40
Mar. 1-10	5,442	32	2	3.70	42.5	6.4	5.5	.07	.40	38	8.9	8.3	0	150	5.5	--	3.0	234	148	148	36
Mar. 11-15	16,160	34	1	4.10	32.1	6.4	1.5	.03	.50	24	7.4	11	0	116	3.5	--	3.5	190	104	104	17
Mar. 16-20	18,740	35	1	4.8	16.5	2.8	.2	.02	.24	15	4.1	6.9	3	59	3.2	--	3.3	102	56	53	4
Mar. 21-31	16,280	39	3	4.45	19.2	4.2	.5	.01	.25	14	4.0	10	0	63	6.8	--	3.2	114	56	56	7
Apr. 1-10, 1947	14,020	46	2	4.30	18.3	3.8	0.7	0.02	0.20	12	3.7	8.7	0	60	4.0	--	3.0	101	52	52	12
Apr. 11-20	4,763	57	2	4.25	25.5	5.0	1.5	.03	.29	18	5.7	11	0	92	3.8	--	3.1	151	79	79	15
Apr. 21-30	3,321	56	1	4.15	33.8	4.8	1.8	.03	.45	24	7.9	15	0	123	5.8	--	3.2	200	106	106	19
May 1-10	7,800	56	3	4.20	33.0	5.2	2.1	.03	.15	24	7.2	12	0	118	3.9	--	2.2	188	106	105	36
May 11-20	7,349	58	2	4.6	29.7	5.0	1.2	.03	.16	26	7.2	12	1	114	4.1	--	2.1	184	102	101	17
May 21-31	10,080	65	2	5.2	24.5	4.8	--	.02	.11	24	6.6	9.6	4	93	4.5	--	1.8	154	87	84	--
June 1-10	10,230	66	2	5.9	26.9	5.8	--	.07	.13	25	7.0	14	7	103	4.8	--	2.1	171	91	85	--
June 11-20	8,940	69	1	5.5	21.5	4.8	--	.02	.12	20	5.6	10	6	82	3.2	--	1.2	132	73	68	--
June 21-30	1,675	72	3	6.0	32.0	5.0	--	.02	.50	26	8.3	22	6	127	5.8	--	2.4	208	99	94	6
July 1-10	2,708	74	3	4.15	43.0	5.8	2.6	.04	.50	32	10	27	0	179	7.0	--	1.2	278	139	139	28
July 11-20	6,480	75	3	3.90	45.2	6.6	3.9	.09	.75	32	11	19	0	179	6.0	--	1.3	272	154	154	41
July 21-31	3,815	75	3	4.9	35.2	5.6	1.1	.03	.55	32	9.1	19	4	147	6.2	--	1.5	232	124	121	14
Aug. 1-10	4,222	75	2	3.95	45.0	6.2	3.1	.07	.55	33	11	22	0	180	7.0	--	1.0	275	151	151	38
Aug. 11-20	2,908	79	1	3.80	51.4	6.8	2.9	.05	1.1	38	12	22	0	197	8.1	--	2.5	316	171	171	40
Aug. 21-31	4,220	79	1	3.70	43.3	6.4	3.0	.14	.75	27	8.7	17	0	153	5.8	--	1.1	236	132	132	46
Sept. 1-10	2,699	78	0	3.80	49.5	6.6	2.9	.38	.91	32	10	25	0	183	7.2	--	.9	284	148	148	46
Sept. 11-20	3,478	76	0	3.70	49.9	6.6	3.2	.30	.80	29	9.7	23	0	175	8.8	--	.8	263	142	142	50
Sept. 21-30	2,348	73	2	3.80	49.5	6.0	2.6	.16	.81	32	10	24	0	179	7.9	--	1.0	281	145	145	42
Average	6,383	55	2	--	46.0	6.3	--	0.10	0.68	31	10	--	--	172	11	--	2.1	271	--	--	--

MO . . . IELA . . . AT . . . EROI, . .

LOCATION.--At Mercantile Bridge Co. toll bridge, approximately 1¼ miles u stream from gaging station at Charleroi, Washington Cou. , and 1 mile downstream from Lock 4.
DRAINAGE AREA.--5,213 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1944 to September 1948.
Water temperatures: October 1944 to September 1948.
EXTREMES, 1947-48.--Specific conductance: Maximum, 752 Sept. 1-10; minimum, 176 Apr. 13-14.
Water temperatures: Maximum, 86° F. Sept. 1; minimum, freezing point Jan. 23-24, 29-31.
EXTREMES, 1944-48.--Dissolved solids (1944-47): Maximum, 749 parts per million Sept. 11-20, 1946; minimum, 99 parts per million Feb. 11-20, 1946.
Total hardness (1944-47): Maximum, 399 parts per million Sept. 11-20, 1946; minimum, 52 parts per million Apr. 1-10, 1947.
Specific conductance: Maximum, 1,210 Sept. 11-20, 1946; minimum, 163 Nov. 21-30, 1945.
Water temperatures: Maximum, 86° F. Sept. 1, 1948; minimum, freezing point on many days in winter months.
REMARKS.--Discharge records for gaging station at Charleroi, Pa., for water year October 1947 to September 1948 given in Water-Supply Paper 1113. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains. Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa.

Chemical analyses, in parts per million, water year October 1947 to September 1948

Date of collection	Mean discharge (second-feet)	Temperature (° F.)	Color	pH	Specific conductance (micromhos at 25° C.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Non-carbonate	
Oct. 1-10, 1947	1,102	66	1	3.70	557	6.2	2.8	0.13	0.80	37	12	33		0	215	12	0.2	0.8	337	169	169	45
Oct. 11-20	778	68	2	3.70	700	8.0	3.9	.27	1.4	49	16	35		0	272	12	.3	.8	444	223	223	56
Oct. 21-30	838	69	1	3.65	712	--	--	.22	--	--	--		--	0	295	14	--	1.1	--	--	--	58
Nov. 1-10	2,273	60	0	3.45	740	--	--	.25	--	--	--		--	0	287	16	--	1.1	--	--	--	75
Nov. 11-20	5,582	52	0	3.70	517	--	--	.12	--	--	--		--	0	192	12	--	1.1	--	--	--	52
Nov. 21-30	4,643	45	0	4.30	356	--	--	.01	--	--	--		--	0	134	8	--	--	--	--	--	15
Dec. 1-10	5,094	42	2	4.25	347	--	--	.02	--	--	--		--	0	130	8	--	--	--	--	--	14
Dec. 11-20	6,836	39	1	4.8	241	--	--	.01	--	--	--		--	2	90	5	--	--	--	--	--	9
Dec. 21-31	2,547	35	0	4.30	274	--	--	.02	--	--	--		--	0	101	5	--	--	--	--	--	10
Jan. 1-10, 1948	20,458	39	4	4.30	241	5.2	.7	.03	.60	20	5.8	9.1		0	88	4.4	.1	3.2	150	81	81	11
Jan. 11-20	9,544	36	1	4.00	267	--	--	.04	--	--	--		--	0	94	3	--	--	--	--	--	22
Jan. 21-31	3,193	33	1	3.80	369	--	--	.04	--	--	--		--	0	130	5	--	--	--	--	--	31
Feb. 1-10	2,632	34	0	3.60	501	--	--	.08	--	--	--		--	0	186	5	--	--	--	--	--	41
Feb. 11-13	7,890	34	1	3.40	576	--	--	.12	--	--	--		--	0	203	7	--	--	--	--	--	56
Feb. 14-20	4,630	38	0	4.15	196	--	--	.03	--	--	--		--	0	67	1	--	--	--	--	--	13
Feb. 21-29	2,442	41	3	3.85	218	--	--	.03	--	--	--		--	0	73	1	--	--	--	--	--	18
Mar. 1-10	20,280	43	1	4.05	206	--	--	.03	--	--	--		--	0	71	3	--	--	--	--	--	16
Mar. 11-20	8,883	44	1	3.90	296	--	--	.04	--	--	--		--	0	107	4	--	2.3	--	--	--	26
Mar. 21-31	22,791	52	3	4.35	230	--	--	.04	--	--	--		--	0	86	3.4	--	2.4	--	--	--	16
Apr. 1-10, 1948	12,485	55	3	4.00	273	5.0	1.9	0.02	0.42	21	7.4	7.3		0	104	2.5	0.1	3.8	166	90	90	22
Apr. 11-12, 15-20	32,820	54	3	4.10	303	--	--	.04	--	--	--		--	0	112	2.5	--	2.0	--	--	--	30
Apr. 13-14	102,100	53	3	5.0	170	--	--	.02	--	--	--		--	2	66	2.2	--	3.2	--	--	--	5
Apr. 21-30	7,945	56	0	3.75	471	--	--	.13	--	--	--		--	0	172	4.2	--	1.5	--	--	--	86
May 1-4	16,812	60	5	3.40	565	--	--	.12	--	--	--		--	0	194	4	--	1.5	--	--	--	80
May 5-10	22,950	58	0	4.15	216	--	--	.02	--	--	--		--	0	77	3	--	1.6	--	--	--	18
May 11-20	12,620	62	0	4.10	270	--	--	.02	--	--	--		--	0	103	3	--	1.5	--	--	--	28
May 21-31	4,509	64	3	3.90	395	--	--	.05	--	--	--		--	0	154	6	--	1.2	--	--	--	36
June 1-10	5,944	68	2	3.65	466	--	--	.10	--	--	--		--	0	179	6	--	1.1	--	--	--	34
June 11-20	10,229	70	0	3.85	344	--	--	.04	--	--	--		--	0	124	5	--	1.2	--	--	--	30
June 21-30	5,494	74	2	4.30	285	--	--	.02	--	--	--		--	0	110	4	--	2.4	--	--	--	32
July 1-10	5,807	76	1	3.80	381	--	--	.04	--	--	--		--	0	138	6	--	2.9	--	--	--	40
July 11-20	7,092	76	4	3.75	428	--	--	.08	--	--	--		--	0	156	5	--	2.9	--	--	--	40
July 21-31	16,126	74	1	4.35	205	--	--	.03	--	--	--		--	0	72	3	--	2.2	--	--	--	18
Aug. 1-10	11,408	73	1	4.05	266	--	--	.02	--	--	--		--	0	92	4	--	2.6	--	--	--	28
Aug. 11-20	4,661	72	5	3.90	340	--	--	.04	--	--	--		--	0	120	6	--	2.2	--	--	--	33
Aug. 21-31	2,288	78	3	3.70	461	--	--	.08	--	--	--		--	0	160	6	--	1.7	--	--	--	52
Sept. 1-10	1,378	78	5	3.40	752	8.8	6.7	.21	1.3	46	18	34		0	296	10	.2	.9	445	250	250	86
Sept. 11-20	2,176	75	1	3.45	751	--	--	.28	--	--	--		--	0	251	10	--	1.0	--	--	--	88
Sept. 21-24	8,145	70	2	3.40	737	--	--	.17	--	--	--		--	0	209	8	--	1.0	--	--	--	89
Sept. 25, 27-30	4,975	69	2	3.80	437	--	--	.05	--	--	--		--	0	162	6	--	1.0	--	--	--	40
Average	9,918	57	2	--	402	--	--	0.08	--	--	--		--	0	149	5.9	--	1.8	--	--	--	--

MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1948 to September 1949

Date of collection	Mean discharge (second-feet)	Temperature (° F)	Color	pH	Specific conductance (micromhos at 25° C)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Noncarbonate	
Oct. 1-10, 1948	2,546		12	3.75	417	5.8	2.2	0.09	0.62	25	8.5	19		0	145	5.0	0.1	3.8	226	120	120	28
Oct. 11-20	2,846		1	3.80	386	--	--	.12	--	--	--	--		0	139	6	--	1.6	--	--	--	46
Oct. 21-31	2,721		1	3.85	455	--	--	.06	--	--	--	--		0	173	9	--	2.0	--	--	--	54
Nov. 1-10	3,493		6	3.55	591	--	--	.28	--	--	--	--		0	213	6	--	--	--	--	--	94
Nov. 11-20	4,886		5	3.75	442	5.4	1.4	.04	.73	31	12	13		0	154	7	.0	3.2	249	145	145	49
Nov. 21-30	10,250		5	4.20	294	--	--	.04	--	--	--	--		0	96	5.0	.0	3.0	--	--	--	25
Dec. 1-10	18,020		5	4.6	178	--	--	.00	--	--	--	--		2	66	4	.1	2.6	--	--	--	--
Dec. 11, 13-20	37,040		5	4.5	192	--	--	.04	--	--	--	--		0	63	2.8	.0	3.5	--	--	--	19
Dec. 12	6,900		5	6.5	282	--	--	.02	--	--	--	--		6	77	3	.0	.4	--	--	--	--
Dec. 21-31	16,300		5	4.00	260	--	--	.02	--	--	--	--		0	94	4.0	.0	3.6	--	--	--	35
Jan. 1-4, 6-10, 1949	18,100		5	4.10	256	--	--	.02	--	--	--	--		0	94	4.0	.1	2.8	--	--	--	33
Jan. 5	11,900		10	3.60	510	--	--	.04	--	--	--	--		0	195	6	--	3.0	--	--	--	127
Jan. 11-20	11,150		12	4.15	264	5.8	1.2	.06	.35	20	6.9	6.6		0	91	4	.2	2.6	153	89	89	50
Jan. 21-24	17,640		10	4.10	285	--	--	.02	--	--	--	--		0	107	4	.1	3.0	--	--	--	35
Jan. 25-31	48,200		10	4.40	199	--	--	.00	--	--	--	--		0	76	6	.0	3.8	--	--	--	10
Feb. 1-10	20,950		10	4.10	242	--	--	.00	--	--	--	--		0	90	4	.0	2.2	--	--	--	22
Feb. 11-16, 20	16,350		5	3.90	307	--	--	.02	--	--	--	--		0	113	3	.0	2.5	--	--	--	29
Feb. 17, 18	29,700		10	4.6	184	--	--	.00	--	--	--	--		1	64	2	.1	2.3	--	--	--	--
Feb. 19	22,800		--	3.90	520	--	--	.07	--	--	--	--		0	114	98	.1	2.3	--	--	--	44
Feb. 21-28	21,060		10	4.30	198	--	--	.00	--	--	--	--		0	80	3	.0	2.2	--	--	--	11
Mar. 1-10	12,180		5	4.10	292	--	--	.00	--	--	--	--		0	113	3	.0	1.9	--	--	--	34
Mar. 11-20	14,080		15	4.30	284	--	--	.00	--	--	--	--		0	109	1	.0	2.0	--	--	--	20
Mar. 21-31	12,160		15	3.90	274	--	--	.02	--	--	--	--		0	109	4	.2	2.2	--	--	--	34
Apr. 1-10	11,530		5	4.30	289	6.2	1.0	.02	.58	33	8.0	9.9		0	111	2.3	.2	1.4	173	96	96	21
Apr. 11-20	12,070		20	4.40	283	--	--	.02	--	--	--	--		0	108	6	.0	1.8	--	--	--	16
Apr. 21-30	6,686		10	4.20	335	--	--	.02	--	--	--	--		0	138	4	.1	1.4	--	--	--	25
May 1-10	2,854		10	4.15	421	--	--	.02	--	--	--	--		0	176	8	.1	1.3	--	--	--	33
May 11-20	2,120		20	3.90	524	--	--	.04	--	--	--	--		0	204	2	.2	1.1	--	--	--	40
May 21-31	8,221		10	4.00	456	--	--	.15	--	--	--	--		0	191	6	.2	1.0	--	--	--	34
June 1-10	1,974		3	4.5	394	--	--	--	--	--	--	--		0	161	5.8	.2	.8	--	--	--	16
June 11-20	2,580		10	3.90	515	--	--	.08	--	--	--	--		0	203	8	--	1.4	--	--	--	31
June 21-30	2,736		3	3.70	409	--	--	.10	--	--	--	--		0	152	7	--	.4	--	--	--	32
July 1-10	1,966		1	3.80	504	--	--	.22	--	--	--	--		0	197	7	--	.7	--	--	--	41
July 11-15, 19	6,067		1	3.75	567	--	--	.11	--	--	--	--		0	215	8	--	.3	--	--	--	50
July 16-18, 20	6,630		1	3.70	312	--	--	.10	--	--	--	--		0	117	5	--	.5	--	--	--	22
July 21-25, 30, 31	5,936		1	4.00	369	--	--	.03	--	--	--	--		0	146	8	.2	.9	--	--	--	24
July 26-29	3,942		2	4.30	220	--	--	.02	--	--	--	--		0	83	2	.1	.9	--	--	--	11
Aug. 1-10	1,696		5	3.80	427	--	--	.05	--	--	--	--		0	163	10	.1	3.0	--	118	118	53
Aug. 11-20	4,649		5	3.65	460	--	--	.10	--	--	--	--		0	169	8	.1	3.4	--	128	128	39
Aug. 21-31	3,134		5	3.95	327	--	--	.05	--	--	--	--		0	126	4	.1	2.8	--	97	97	17
Sept. 1-10	1,805		2	4.15	369	6.8	1.4	.07	.70	27	8.9	20		0	144	6.2	.1	1.0	236	116	116	19
Sept. 11-20	992		1	3.95	526	--	--	--	--	--	--	--		0	214	10	--	1.3	--	--	--	30
Sept. 21-30	1,213		1	3.85	462	--	--	--	--	--	--	--		0	179	10	--	2.6	--	--	--	34
Average	9,390		7	4.1	359	--	--	0.05	--	--	--	--		--	134	7.5	--	2.0	--	--	--	34

MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1949 to September 1950

Date of collection	Mean discharge (second-feet)	Temperature (° F)	Color	pH	Specific conductance (micromhos at 25° C)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Noncarbonate	
Oct. 1-10, 1949	1,225		5	3.70	588									0	228	12		1.8		141	141	32
Oct. 11-20	2,435		5	3.65	649									0	258	12		1.1		153	153	43
Oct. 21-31	2,026		5	3.70	580									0	223	12		1.2		139	139	35
Nov. 1	9,380		10	3.75	575									0	219	10		--		--	--	--
Nov. 2-6	11,124		5	4.00	273									0	93	6		1.8		66	66	16
Nov. 7-10	5,965		5	5.0	175									1	58	2		1.6		47	46	--
Nov. 11-13	3,503		5	4.6	183									1	62	5		1.8		52	51	--
Nov. 14-20	4,303		5	4.25	230									0	78	4		1.8		62	62	8
Nov. 21, 22, 30	12,103		2	4.15	207									0	66	5		1.8		53	53	11
Nov. 23-29	5,094		1	3.65	321									0	118	6		1.9		88	88	15
Dec. 1-10	10,690		1	5.2	149									4	52	3		2.6		44	41	--
Dec. 11-20	18,278		2	4.9	174									4	61	4		2.4		56	53	--
Dec. 21-31	17,318		1	4.8	177									4	62	4		1.6		57	54	--
Jan. 1-10, 1950	24,395		1	4.6	203									2	76	4		2.3		66	64	--
Jan. 11-20	19,370		1	4.00	259									0	93	4		2.2		70	70	22
Jan. 21-31	17,615		15	4.10	281									0	77	4		1.8		81	81	29
Feb. 1-10	42,400		0	4.05	224									0	76	1		2.7		76	76	35
Feb. 11-20	20,910		5	4.05	251									0	89	2		2.3		90	90	30
Feb. 21-28	11,068		0	3.85	300									0	109	3		1.9		102	102	42
Mar. 1-10, 1950	8,880		5	3.86	376									0	133	3		1.6		127	127	43
Mar. 11-20	22,300		5	4.15	319									0	77	5		3.2		67	67	19
Mar. 21-31	30,100		5	4.30	304									0	68	2		3.3		61	61	14
Apr. 1-10	10,089		5	4.00	270									0	96	3		3.5		75	75	25
Apr. 11-20	4,142		5	3.80	441									0	105	6		3.3		120	120	32
Apr. 21-26	13,847		0	3.70	441									0	158	6		3.1		103	103	44
Apr. 27-30	14,850		0	4.35	230									0	86	5		1.8		76	76	13
May 1-10	15,045		0	4.45	203									0	72	5		1.7		59	59	16
May 11-20	8,525		0	4.05	285									0	100	4		2.0		67	67	26
May 21-31	8,473		5	4.10	295									0	108	3		2.2		78	78	21
June 1-5	15,588		0	4.15	271									0	97	3		2.0		70	70	20
June 6-10	14,782		5	4.6	180									4	63	2		1.6		52	49	--
June 11-20	6,735		0	4.10	280									0	101	2		1.8		74	74	23
June 21-26	12,550		0	4.10	325									0	126	3		1.8		85	85	25
June 27-30	22,225		5	4.8	166									2	55	2		2.1		48	46	--
July 1-10	4,164		5	5.9	213									3	76	4		2.1		66	63	--
July 11-20	4,762		5	4.20	386									0	164	5		2.3		110	110	34
July 21-31	7,239		5	4.00	325									0	112	4		2.0		89	89	24
Aug. 1-10	2,105		5	4.25	351									0	134	5		1.0		92	92	22
Aug. 11-20	2,606		1	3.80	511									0	213	6		.8		128	128	61
Aug. 21, 23-31	1,446		1	3.96	687									0	305	6		.6		196	196	56
Aug. 22	1,800		1	4.16	362									0	141	6		1.9		99	99	19
Sept. 1-7	5,234		1	3.75	554									0	218	8		.9		144	144	47
Sept. 8	4,070		1	4.00	285									0	110	3		.7		76	76	25
Sept. 10-11, 13	4,552		1	3.80	578									0	238	7		.8		159	159	48
Sept. 14, 16-20	5,551		1	5.0	252									2	100	3		.9		84	82	--
Sept. 21-30	10,834		1	6.2	276									8	104	4		1.3		96	88	--
Average	11,490		3	4.24	314									--	120	4		1.8		87	87	--

106 MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1950 to September 1951

Date of collection	Mean discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Non-carbonate	Total acidity as H_2SO_4	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-10, 1950	2,829								18		0	144	8		2.0		123	123	20	381	4.40	3
Oct. 11-20	4,864								17		0	107	9		1.2		88	88	12	323	4.40	3
Oct. 21-31	2,907								20		0	147	9		1.4		121	121	28	408	4.15	3
Nov. 1-10	14,407								13		3	92	8		1.4		83	81	--	263	4.9	2
Nov. 11-20	6,604								11		4	86	5		1.1		76	73	--	239	5.6	2
Nov. 21-23	11,243								16		2	97	7		1.2		79	77	--	250	4.8	1
Nov. 24-30	11,252								--		--	--	--		--		--	--	--	--	--	--
Dec. 1-10	40,630								7.8		0	75	4		1.4		67	67	18	213	4.45	1
Dec. 11-15, 17-20	16,111								12		0	88	3		.5		66	66	24	344	4.05	1
Dec. 16	16,800								28		0	179	8		.2		122	122	56	494	3.55	1
Dec. 21-31	8,297								22		0	145	5		.6		103	103	38	393	3.80	1
Jan. 1-4, 1951	10,685								21		0	156	5		.7		117	117	37	414	3.80	1
Jan. 5-10	21,800								7.2		0	84	4		.8		70	70	17	238	3.80	2
Jan. 11-20	23,970								--		0	88	3		.4		63	63	14	221	4.40	3
Jan. 21-31	16,404								--		0	100	3		.3		75	75	20	250	4.25	5
Feb. 1-10	35,700								--		0	76	1		.4		60	60	15	307	4.45	4
Feb. 11-20	13,590								--		0	117	4		.8		92	92	28	319	4.00	4
Feb. 21-28	18,956								--		0	97	3		.5		71	71	16	346	4.45	5
Mar. 1-10	17,548								--		0	102	3		.3		79	79	19	300	4.35	5
Mar. 11-17, 20	12,575								15		2	95	3		.9		72	70	--	261	4.9	2
Mar. 18-19	8,650								19		0	141	4		.8		107	107	26	379	4.10	2
Mar. 21-31	16,602								12		0	80	4		.8		72	72	13	249	4.40	2
Apr. 1-10, 1951	21,220								9.2		2	81	3		0.9		71	69	--	222	5.0	3
Apr. 11-20	32,120								10		2	78	3		.9		66	64	--	214	4.9	5
Apr. 21-30	12,233								13		2	99	3		.9		82	80	--	265	4.8	5
May 1-10	15,120								14		0	104	2		.8		81	81	34	271	4.40	6
May 11-20	11,013								16		0	121	4		.8		97	97	25	290	4.40	7
May 21-31	3,893								29		0	182	5		1.0		129	129	37	444	3.95	5
June 1-10	5,264								35		0	208	5		.8		135	135	60	552	3.60	4
June 11-20	29,253								10		0	82	4		.7		68	68	12	221	4.40	1
June 21-30	6,600								21		0	128	5		.5		91	91	28	319	4.00	2
July 1-10	8,251								17		0	138	6		.3		113	113	22	358	4.30	2
July 11-20	3,236								28		0	169	5		.8		126	126	33	428	4.15	4
July 21-31	4,283								34		0	208	5		.9		150	150	33	510	3.80	5
Aug. 1-10	1,531								43		0	268	7		.8		196	196	32	630	4.10	3
Aug. 11-20	1,249								46		0	280	7		.8		182	182	31	621	4.10	5
Aug. 21-31	1,001								--		0	305	10		.8		188	188	57	753	3.60	5
Sept. 1-10	1,556								--		0	362	10		.8		212	212	68	872	3.30	5
Sept. 11-20	1,251								--		0	342	10		1.0		218	218	74	860	3.40	5
Sept. 21-30	874								--		0	355	11		1.3		218	218	70	867	3.50	3
Average	11,810								19		--	149	5		0.8		108	108	31	384	4.22	3

106 MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1951 to September 1952

Date of collection	Mean discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total acidity as H_2SO_4	Specific conductance (micromhos at 25°C)	pH	Color
																	Calcium, magnesium	Noncarbonate				
Oct. 1-10, 1951	774		4.8	7.6	0.06	1.2	60	22	80		0	371	18	0.3	1.6	566	340	340	88	896	3.60	3
Oct. 11-20	640		--		--		--	--	85		--	366	17	--	.8	--	220	220	78	886	3.80	3
Oct. 21-31	504		--		--		--	--	113		--	473	20	--	.4	--	275	275	91	1,070	3.80	5
Nov. 1-10	1,768		--		--		--	--	97		--	436	19	--	.6	--	270	270	71	1,010	3.60	6
Nov. 11-20	2,361		--		--		--	--	68		--	295	16	--	1.7	--	180	180	39	748	4.6	5
Nov. 21-26	9,400		--		--		--	--	45		--	203	17	--	2.4	--	140	140	41	561	4.5	5
Nov. 27-30	17,700		--		--		--	--	8.1		1.0	81	7.0	--	3.2	--	80	79	--	256	5.4	6
Dec. 1-10	8,574		--		--		--	--	14		--	76	4.5	--	3.2	--	67	65	12	210	4.8	4
Dec. 11-20	16,280		--		--		--	--	14		3.0	78	5.5	--	2.4	--	64	62	--	196	5.9	4
Dec. 21-31	19,802		--		--		--	--	7.9		3.0	61	4.5	--	2.2	--	57	55	--	181	5.6	7
Jan. 1-10, 1952	33,490		--		--		--	--	7.9		2.0	73	4.0	--	2.2	--	68	66	--	216	5.4	6
Jan. 11-20	14,331		--		--		--	--	15		--	93	4.0	--	.6	--	70	70	25	253	4.20	3
Jan. 21-31	32,490		--		--		--	--	9.3		--	90	6.0	--	.7	--	72	72	18	210	4.5	3
Feb. 1-10	19,375		--		--		--	--	16		--	121	8.0	--	.8	--	104	104	23	318	4.30	3
Feb. 11-20	7,486		--		--		--	--	23		--	156	8.5	--	.2	--	124	124	39	403	4.00	5
Feb. 21-29	6,215		--		--		--	--	24		--	169	8.5	--	.4	--	136	136	28	420	4.30	3
Mar. 1-10	8,096		--		--		--	--	25		--	180	9.5	--	.6	--	146	146	26	445	4.40	3
Mar. 11-20	19,232		--		--		--	--	13		0	107	5.0	--	1.5	--	92	92	20	280	4.5	5
Mar. 21-31	18,630		--		--		--	--	14		2	107	5.5	--	1.8	--	92	90	--	273	5.4	5
Apr. 1-10	8,506		--		--		--	--	17		0	120	5.5	--	1.0	--	96	96	23	301	4.20	6
Apr. 11-20	16,264		--		--		--	--	8.6		0	95	5.0	--	1.0	--	88	86	17	244	4.5	5
Apr. 21-30	15,610		--		--		--	--	21		2	104	5.0	--	.9	--	72	70	25	248	4.6	5
May 1-10, 1952	7,481		--		--		--	--	8.5		0	96	4.0	--	1.0	--	88	86	16	268	4.40	5
May 11-12	12,946		--		--		--	--	13		0	98	4.0	--	1.4	--	80	80	17	300	4.40	5
May 21-31	22,318		2.6		0.04		20	6.3	9.3		3	84	3.5	.1	1.1	135	76	73	--	220	5.3	5
June 1-10	3,349		--		--		--	--	22		0	156	5.0	--	1.5	--	122	122	36	361	4.5	5
June 11-20	1,891		--		--		--	--	47		0	240	8.0	--	.7	--	168	168	80	503	4.00	5
June 21-30	2,940		--		--		--	--	49		0	267	10	--	.3	--	185	185	90	718	3.80	5
July 1-10	2,498		--		--		--	--	43		--	239	10	--	.5	--	170	170	67	648	3.80	5
July 11-20	1,942		--		--		--	--	67		--	330	16	--	.5	--	220	220	93	680	3.60	5
July 21-31	1,247		--		--		--	--	64		--	348	15	--	1.2	--	246	246	76	677	3.50	5
Aug. 1-10	1,015		--		--		--	--	46		0	270	31	--	5.8	--	230	230	17	719	4.7	2
Aug. 11-20	2,875		--		--		--	--	67		0	349	16	--	.8	--	210	210	102	873	3.30	2
Aug. 21-31	2,133		--		--		--	--	45		--	257	11	--	1.0	--	154	154	64	669	3.50	5
Sept. 1-10	901		--		--		--	--	59		--	297	11	--	2.3	--	198	198	66	726	3.70	2
Sept. 11-20	987		--		--		--	--	65		0	343	15	--	3.5	--	240	240	64	842	3.60	2
Sept. 21-31	802		--		--		--	--	64		0	346	16	--	2.3	--	245	245	74	860	3.60	3
Average	9,217		--		--		--	--	38		1.0	205	10	--	1.5	--	146	145	48	518	--	5

MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, February to September 1956

Date of collection	Mean discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Total acidity as H+	Specific conductance (micromhos at 25°C)	pH	Colo
Feb. 9, 1956	36,900		--	--	--	--	--	--			0	77	2.3	--	2.5	--	68	68	0.4	213	4.20	2
Mar. 28	18,200		10	1.9	0.06	0.00	20	4.3			0	93	1.5	0.1	.9	169	68	68	.5	255	4.20	1
Apr. 13	12,900		--	--	--	--	--	--			0	105	3.5	--	1.6	--	89	89	.4	258	4.5	2
May 18	12,900		--	--	--	--	--	--			1	110	4.5	--	2.2	--	98	97	--	291	4.7	2
June 16	3,500		--	--	--	--	--	--			0	149	5.0	--	.9	--	103	103	.8	395	4.10	2
June 27	15,400		7.9	1.1	.01	.60	23	4.1	9.3	1.6	0	100	2.5	.2	1.6	180	87	87	.2	268	4.45	2
Aug. 2	11,100		--	--	--	--	--	--			0	78	5.0	--	1.6	--	68	68	--	228	4.40	2
Sept. 7	10,700		--	--	--	--	--	--			0	249	8.5	--	.6	--	162	162	.6	540	4.20	5

Chemical analyses, in parts per million, water year October 1952 to September 1953

Date of collection	Mean discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Total acidity as H_2SO_4	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-10, 1952	871		--		--		--	--	92		0	444	23	--	7.6	--	300	300	110	1,050	3.50	2
Oct. 11-20	823		11		0.46		72	8	115		0	410	22	0.3	4.0	693	213	213	84	1,080	3.40	0
Oct. 21-31	835		--		--		--	--	96		0	417	21	--	6.0	--	260	260	108	991	3.50	0
Nov. 1-10																						
Nov. 11-20	694		--		--		--	--	97		0	460	24	--	8.9	--	310	310	119	1,040	3.80	1
Nov. 21-30	2,585		--		--		--	--	78		0	390	20	--	1.3	--	265	265	122	988	3.50	1
Dec. 1-10	2,049		--		--		--	--	51		0	227	15	--	4.5	--	150	150	71	608	3.70	5
Dec. 11-20	10,930		--		--		--	--	19		0	129	11	--	3.1	--	110	110	33	348	4.30	0
Dec. 21-31	4,209		--		--		--	--	7.9		0	84	6.0	--	1.5	--	80	80	28	254	4.20	5
Jan. 1-10, 1953	11,960		--		--		--	--	15		0	105	8.0	--	3.7	--	92	92	20	327	4.25	4
Jan. 11-20	17,550		--		--		--	--	3.5		0	62	5.0	--	2.6	--	66	66	20	203	4.40	4
Jan. 21-31	20,491		--		--		--	--	6.2		0	70	5.0	--	1.9	--	68	68	21	195	4.6	1
Feb. 1-10	10,443		--		--		--	--	5.8		0	81	4.0	--	.8	--	78	78	29	227	3.80	2
Feb. 11-20	17,085		--		--		--	--	6.1		0	80	5.0	--	1.2	--	78	78	25	224	4.40	3
Feb. 21-28	14,229		--		--		--	--	6.1		0	83	5.0	--	1.0	--	80	80	26	227	4.15	3
Mar. 1-10	12,434		--		--		--	--	9.3		0	91	6.0	--	1.3	--	84	84	28	248	4.20	4
Mar. 11-20	14,590		5.3		.01		17	3.5	13		a 18	77	4.5	.0	1.3	139	57	57	--	215	3.80	4
Apr. 1-10, 1953	16,860		--		--		--	--	4.5		0	70	4.0	--	1.6	--	70	70	14	225	4.40	4
Apr. 11-20	16,230		--		--		--	--	2.7		0	73	6.0	--	1.7	--	80	80	12	234	4.30	--
Apr. 21-30	10,316		--		--		--	--	7.3		0	90	5.0	--	1.5	--	86	86	16	260	4.20	--
May 1-10	15,600		--		--		--	--	14		0	100	6.0	--	1.8	--	84	84	16	281	4.20	--
May 11-20	10,797		--		--		--	--	8.2		0	98	3.5	--	1.0	--	90	90	18	286	4.40	4
May 21-31	7,929		--		--		--	--	19		0	118	5.5	--	2.8	--	92	92	20	319	4.20	2
June 1-10	1,825		--		--		--	--	25		0	154	7.5	--	.5	--	116	116	26	398	4.20	2
June 11-20	1,607		--		--		--	--	46		0	230	10	--	3.4	--	156	156	44	575	3.80	3
June 21-30	1,302		--		--		--	--	49		0	244	11	--	3.5	--	165	165	29	678	3.50	3
Average	b 9,650		--		--		--	--	31		--	172	9.6	--	2.7	--	127	127	42	450	--	3

b For period of record only; mean discharge for water year was 7,022 cfs.

a Includes equivalent of 2 parts per million of carbonate (CO_3).

MONONGAHELA RIVER AT CHARLEROI, PA.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO$_2$)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO$_3$)	Sulfate (SO$_4$)	Chloride (Cl)	Fluoride (F)	Nitrate (NO$_3$)	Dissolved solids (residue on evaporation at 180°C)	Hardness as CaCO$_3$ Calcium magnesium	Hardness as CaCO$_3$ Noncarbonate	Total acidity (H^{+1})	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-10, 1956	3,100	9.8	0.5	0.13	--	45	15	42	3.4	0	261	12	0.1	2.9	404	182	182	0.8	628	3.90	3
Oct. 11-20	2,320	--	--	--	--	--	--	--	--	0	279	10	--	1.4	--	184	184	.9	665	4.00	1
Oct. 21-31	2,250	--	--	--	--	--	--	--	--	0	271	16	--	.9	--	170	170	.8	651	3.80	1
Nov. 1-10	4,970	--	--	--	--	--	--	--	--	0	238	9.2	--	1.3	--	146	146	.8	608	3.90	1
Nov. 11-20	3,450	--	--	--	--	--	--	--	--	0	191	7.2	--	3.7	--	126	126	.5	470	4.00	2
Nov. 21-30	4,440	--	--	--	--	--	--	--	--	0	160	4.6	--	2.0	--	96	96	.5	398	4.10	1
Dec. 1-10	7,490	--	--	--	--	--	--	--	--	0	155	7.1	--	3.1	--	104	104	.4	399	4.25	1
Dec. 11-20	30,800	--	--	--	--	--	--	9.5		2	76	2.9	--	2.3	--	66	64	--	208	4.7	2
Dec. 21-31	22,400	--	--	--	--	--	--	9.5		2	76	3.1	--	1.8	--	66	64	--	204	4.8	3
Jan. 1-10, 1957	10,400	--	--	--	--	--	--	18		1	113	3.6	--	1.8	--	86	85	--	283	4.6	2
Jan. 11-31	21,500	--	--	--	--	--	--	12		2	89	3.3	--	2.0	--	74	72	--	232	4.8	1
Feb. 21-28	8,690	7.7	1.9	.01	0.32	26	7.7	14	1.3	0	131	3.6	.2	1.2	199	112	112	.4	337	4.10	3
Mar. 4-13	12,400	6.5	.5	.01	.23	23	6.3	9.8	1.1	2	98	3.2	.1	1.9	162	87	86	--	255	4.8	3
Mar. 15-Apr. 3	8,370	7.7	1.5	.00	68	30	8.2	17	1.4	0	146	5.2	.2	1.3	228	122	122	.3	371	4.10	3
Apr. 4-17	20,300	--	--	--	--	--	--	11		4	86	4.0	--	1.9	--	77	74	--	215	5.7	1
Apr. 18-25	7,090	--	--	--	--	--	--	22		11	119	7.0	--	2.5	--	96	87	--	295	6.2	3
Apr. 27-May 4	5,890	--	--	--	--	--	--			0	167	6.5	--	.5	--	120	120	.3	393	4.5	2
May 5-8	2,640	--	--	--	--	--	--	37		1	246	7.0	--	.6	--	188	187	.3	545	4.8	2
May 9-15	2,060	--	--	--	--	--	--	41		2	190	7.0	--	.9	--	120	118	--	449	4.9	3
May 16-20, 1957	3,200	--	--	--	--	--	--	18		2	228	10	--	0.9	--	157	156	--	540	4.7	3
May 21-June 7	3,060	--	--	--	--	--	--	--	--	0	196	7.7	--	5.2	--	120	120	0.5	477	3.80	5
June 8-24	2,790	--	--	--	--	--	--	--	--	0	284	12	--	3.8	--	166	166	.9	705	3.50	5
June 25-July 4	4,110	--	--	--	--	--	--	--	--	0	204	8.5	--	2.7	--	112	112	.6	525	3.80	2
July 5-9	2,400	--	--	--	--	--	--	--	--	0	108	8.6	--	3.8	--	58	58	.4	296	3.70	3
July 10-21	1,390	--	--	--	--	--	--	--	--	0	231	9.9	--	3.8	--	136	136	.6	586	3.60	5
July 22-31	1,190	--	--	--	--	--	--	--	--	0	348	11	--	3.3	--	195	195	.9	808	3.50	5
Aug. 1-12	947	--	--	--	--	--	--	--	--	0	227	10	--	2.6	--	130	130	.6	565	3.65	2
Aug. 13-31	726	--	--	--	--	--	--	--	--	0	296	11	--	2.1	--	140	140	1.1	732	3.45	2
Sept. 1-24	841	12	2.5	0.11	1.8	51	20	54	3.4	0	347	11	0.2	.7	536	252	252	1.0	816	3.35	2
Sept. 25-30	968	--	--	--	--	--	--	--	--	0	424	19	--	1.1	--	245	245	1.3	964	3.45	3
Weighted-average	7,110	--	--	--	--	--	--	--	--	1	202	8.0	--	2.2	--	133	132	0.5	496	--	3

MONONGAHELA RIVER AT CHARLEROI, PA.

LOCATION.--At Merchantile Bridge Company toll bridge, approximately 1½ miles downstream from gaging station at Charleroi, Washington County, and 1 mile downstream from lock 4.
DRAINAGE AREA.--5,213 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1944 to June 1953, October 1956 to September 1958.
Water temperatures: October 1944 to June 1953, October 1956 to September 1958
EXTREMES, 1957-58.--Hardness: Maximum, 284 ppm Oct. 1-14; minimum, 41 ppm May 9-18.
Specific conductance: Maximum daily, 1,020 micromhos Oct. 8; minimum daily, 113 micromhos Apr. 9.
Water temperatures: Maximum, 79°F July 9; minimum, freezing point on many days during winter months.
EXTREMES (1944-53, 1956-58).--Dissolved solids (1944-47): Maximum, 749 ppm Sept. 11-20, 1946; minimum, 99 ppm Feb. 11-20, 1946.
Hardness: Maximum, 399 ppm Sept. 11-20, 1946; minimum, 41 ppm May 9-18, 1958.
Specific conductance: Maximum daily, 1,330 micromhos Oct. 27, 1946; minimum daily, 113 micromhos Apr. 19, 1958.
Water temperatures: Maximum, 86°F Sept. 1, 1948, June 29, 1952; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa. Records of discharge for water year October 1957 to September 1958 given in WSP 1555.

Chemical analyses, in parts per million, water year October 1957 to September 1958

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^+	Specific conductance (micromhos at 25°C)	pH	Color
																Calcium, magnesium	Noncarbonate				
Oct. 1-14, 1957	1,590	12	2.5	0.20	1.6	51	27	58	2.9	0	379	16	0.2	1.1	577	284	284	1.4	920	3.30	3
Oct. 16-26	3,570	--	--	--	--	--	--	--	--	0	309	14	--	1.8	--	160	160	1.2	778	3.35	2
Oct. 27-Nov. 15	3,240	--	--	--	--	--	--	--	--	0	225	6.8	--	1.8	--	146	146	.6	547	3.45	2
Nov. 16-Dec. 8	7,230	--	--	--	--	--	--	--	--	0	163	6.8	--	1.4	--	114	114	.4	407	3.80	2
Dec. 9-19	17,620	--	--	--	--	--	--	--	--	0	37	2.2	--	1.4	--	54	54	.1	176	4.25	2
Dec. 20-31	20,410	--	--	--	--	--	--	--	--	0	94	2.6	--	1.3	--	74	74	.2	233	4.15	2
Jan. 1-10, 1958	5,380	--	--	--	--	--	--	--	--	0	87	3.0	--	1.2	--	70	70	.2	236	4.40	2
Jan. 11-20	10,330	--	--	--	--	--	--	--	--	0	136	4.5	--	1.2	--	111	111	.4	357	3.85	2
Jan. 21-Feb. 5	15,080	--	--	--	--	--	--	--	--	0	92	3.0	--	1.1	--	75	75	.2	237	4.20	2
Feb. 6-9, 1958	16,140	--	--	--	--	--	--	--	--	0	140	4.2	--	0.9	--	104	104	0.5	335	3.85	3
Feb. 24-27	17,560	--	--	--	--	--	--	--	--	0	165	4.8	--	.7	--	132	132	.6	410	3.85	3
Feb. 28-Mar. 6	23,100	5.8	0.7	0.01	0.45	19	5.7	6.0	1.2	0	84	5.6	0.0	1.4	150	86	86	.1	214	4.35	4
Mar. 7-12	9,810	--	--	--	--	--	--	--	--	0	80	3.2	--	1.5	--	60	60	.4	218	4.15	5
Mar. 13-20	5,900	--	--	--	--	--	--	--	--	0	124	4.5	--	2.0	--	88	88	.5	315	3.80	5
Mar. 21-26	10,800	--	--	--	--	--	--	--	--	0	182	5.5	--	2.7	--	132	132	.7	433	3.60	4
Mar. 30-Apr. 10	18,270	5.7	--	.35	.28	15	3.9	5.2	1.1	3	56	2.4	.1	1.2	103	55	53	--	166	4.9	5
Apr. 11-29	14,040	--	--	--	--	--	--	--	--	0	74	2.8	--	1.2	--	56	56	.2	190	4.25	3
Apr. 30-May 8	38,220	6.3	--	.04	.29	19	5.1	4.8	1.2	6	68	2.4	.1	2.0	113	73	68	--	177	6.3	3
May 9-18	20,480	--	--	--	--	--	--	26	--	2	88	2.0	--	.7	--	41	40	.1	222	4.8	2
May 19-24	4,650	--	--	--	--	--	--	--	--	0	128	3.1	--	.6	--	106	106	.4	337	4.30	5
May 25-June 4	2,890	--	--	--	--	--	--	--	--	0	232	7.0	--	.5	--	136	136	.8	543	3.75	2
June 5-23	3,940	11	1.8	.00	1.4	48	19	30	1.9	0	270	9.0	.1	.4	421	198	198	1.3	673	3.50	5
June 24-July 7, 9-17	6,720	--	--	--	--	--	--	--	--	0	163	4.1	--	.9	--	124	124	.4	405	3.90	2
July 18-29	21,530	--	--	--	--	--	--	9.2	--	1	86	2.0	--	.7	--	74	73	--	206	4.8	3
July 30-31-Aug. 1-3, 5-17	20,900	7.9	.2	.02	.00	16	4.4	4.5	1.5	2	68	2.0	.0	.9	107	58	57	.1	169	4.9	3
Aug. 18-21	6,990	--	--	--	--	--	--	--	--	0	101	2.5	--	.7	--	74	74	.2	237	4.40	3
Aug. 22-31	4,200	--	--	--	--	--	--	--	--	0	137	2.5	--	.6	--	96	96	.4	318	4.10	5
Sept. 1-5	2,180	--	--	--	--	--	--	--	--	0	163	3.5	--	.3	--	110	110	.4	373	4.00	3
Sept. 6-24	2,260	10	3.7	.05	1.3	44	13	30	2.2	0	239	7.0	.2	1.4	--	164	164	.4	551	3.90	3
Weighted average	12,000	--	--	--	--	--	--	--	--	--	154	5.1	--	1.2	--	111	110	0.5	378	--	3

106 MONONGAHELA RIVER AT CHARLEROI, PA.

LOCATION.--At Charleroi Water Plant pumping station, at mile 42.6, at Charleroi, Washington County, 1.1 mile upstream from gaging station.
DRAINAGE AREA.--5,213 square miles at gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1944 to June 1953, October 1956 to September 1958, July 1959 to December 1959.
Water temperatures: October 1944 to June 1953, October 1956 to September 1958.
REMARKS.--The 1959 national steel strike (July 15 to Nov. 7, 1959) was in effect during most of the sampling period. Daily samples were collected Monday through Thursday each week. Analyses for phenol, threshold odor, and oxygen consumed were made on samples collected on Tuesdays and Thursdays. Threshold odor code symbols are those given in American Public Health Association, 1960 Standard methods for the examination of Water and Wastewater, 11th ed., p. 255. Previous chemical and temperature records collected at a point approximately 2½ miles downstream.

Chemical analyses, in parts per million, July to December 1959

Date	Iron (Fe)	Manganese (Mn)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Fluoride (F)	Phenols as C_6H_5OH (Tuesday)	Phenols as C_6H_5OH (Thursday)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Acidity (H^+)		Specific conductance (micromhos at 25° C)	pH	Turbidity	Threshold odor (Tuesday)	Threshold odor (Thursday)	Oxygen consumed (Tuesday)	Oxygen consumed (Thursday)
									Calcium, magnesium	Noncarbonate	Immediate	Potential free							
July 21-23, 1959---	0.58	1.4	0	334	0.2	0.000	0.000	487	a212	a212	1.1	1.0	804	3.50	a0	1	1	--	--
July 28-30---------	.91	1.4	0	319	.3	.000	.001	454	a176	a176	1.3	1.3	792	3.35	a1	0	0	1	1
Aug. 3-6-----------	2.2	1.7	0	368	[illegible]	.005	.004	527	a227	a227	1.7	1.8	913	3.30	a5	1M	0	1	2
Aug. 10-13---------	.48	1.5	0	340	.3	.000	.008	496	a210	a210	1.1	1.0	808	3.45	a2	1M	0	2	[illegible]
Aug. 17-18---------	.35	1.8	0	324	.4	.009	--	480	a207	a207	.9	1.0	782	3.50	a5	0	--	1	--
Aug. 25-27---------	.57	1.8	0	308	.2	.005	.008	453	a191	a191	1.1	1.1	778	3.40	a5	0	1M	2	3
Sept. 1-3----------	.82	1.9	0	411	.2	.003	.001	586	a243	a243	1.3	1.4	942	3.35	a4	1M	0	2	2
Sept. 7-10---------	1.2	2.1	0	388	.2	--	.001	537	241	241	1.4	1.3	900	3.30	2	--	1M	--	--
Sept. 14-17--------	.98	1.7	0	353	.2	--	.001	478	225	225	1.2	1.1	811	3.45	5	--	0	--	--
Sept. 21-24--------	1.1	1.9	0	302	.3	--	.001	512	208	208	1.2	1.1	809	3.40	2	--	1M	--	--
Sept. 28-Oct. 1----	.62	1.4	0	308	.2	--	.001	466	195	195	.8	1.0	771	3.40	5	--	1E	--	--
Oct. 5-8-----------	.88	1.6	0	314	.2	--	.000	448	186	186	1.2	1.1	778	3.40	3	--	1Ch	--	--
Oct. 12-15---------	1.4	1.6	0	345	.2	--	.001	503	210	210	1.2	1.2	849	3.40	2	--	0	--	--
Oct. 19-22---------	1.3	1.6	0	358	.2	--	.000	525	218	218	1.8	1.8	869	3.40	4	--	1M	--	--
Nov. 2-5-----------	.28	.72	0	128	.1	--	.001	180	87	87	1.3	.5	324	4.05	4	--	2Ch	--	--
Nov. 9-12----------	.14	.77	0	127	.2	--	.000	202	87	87	.4	.3	331	4.00	3	--	2M	--	--
Nov. 16-19---------	.16	1.8	0	249	.2	.000	.000	365	a188	a188	.7	.7	590	3.70	a14	4Df	8Df	--	--
Nov. 23-26---------	.09	1.0	0	138	.1	.000	.000	214	a105	a105	.4	.4	348	4.05	a10	8M	8Df	--	--
Nov. 30-Dec. 3-----	.06	.76	0	89	.1	.002	.000	147	a84	a82	.1	.1	235	4.5	a24	8Df	32Df	--	--
Dec. 7-10----------	.11	.40	1	69	.1	--	.000	110	58	57	.2	.1	188	4.7	25	--	32Df	--	--

a Average of analyses of individual daily samples of the composite period.

108a MONONGAHELA RIVER AT CLAIRTON, PA.

LOCATION.--At Clairton Bridge, at Clairton, Allegheny County, at mile 19.3, 3.8 miles upstream from the Youghiogheny River and 4.5 miles downstream from Lock and Dam No. 3.

RECORDS AVAILABLE.--Chemical analyses: July to December 1959.

REMARKS.--The 1959 national steel strike (July 15 to Nov. 7, 1959) was in effect during most of the sampling period. Daily samples were collected Monday through Thursday each week. Analyses for phenol, threshold odor, and oxygen consumed were made on samples collected on Tuesdays and Thursdays. Threshold odor code symbols are those given in American Public Health Association, 1960 Standard methods for the examination of Water and Wastewater, 11th ed., p. 255.

Chemical analyses, in parts per million, July to December 1959

Date	Iron (Fe)	Manganese (Mn)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Fluoride (F)	Phenols as C_6H_5OH (Tuesday)	Phenols as C_6H_5OH (Thursday)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Acidity (H^+)		Specific conductance (micromhos at 25° C)	pH	Turbidity	Threshold odor (Tuesday)	Threshold odor (Thursday)	Oxygen consumed (Tuesday)	Oxygen consumed (Thursday)
									Calcium, magnesium	Noncarbonate	Immediate	Potential free							
July 21-23, 1959---	0.11	1.6	0	336	0.5	1.31	0.080	527	a225	a225	0.6	0.6	753	4.15	a2	2	2	--	--
July 27-30----------	.22	1.5	0	360	.3	.021	.030	542	a229	a229	.9	.8	810	3.75	a5	4	4Ch	2	2
Aug. 3-6-----------	.29	1.6	0	344	.3	.238	.099	530	a218	a218	.8	.9	793	3.80	a20	32Ch	16Ch	4	2
Aug. 10-13---------	.46	2.1	0	404	4	.111	.145	611	a255	a255	1.2	1.2	914	3.50	a9	16Ch	8Ch	2	2
Aug. 17-19---------	.16	1.4	0	300	.4	.079	--	448	a196	a196	.7	.6	704	3.80	a6	32Ch	--	3	--
Aug. 24-27---------	.16	1.9	0	352	.3	.082	.013	523	a240	a240	.6	.6	786	3.95	a9	125Ch	4Ch	3	2
Aug. 31-Sept. 3	.14	1.6	0	331	.3	.003	.001	504	a214	a214	.6	.6	744	3.80	a8	7Dm	1C	3	3
Sept. 8-10---------	.30	2.0	0	435	.4	--	.164	668	266	266	.9	.8	957	3.60	2	--	32Ch	--	--
Sept. 16-17--------	.76	2.3	0	483	.3	--	.123	730	310	310	.8	.7	983	4.00	9	--	64Ch	--	--
Sept. 21-24--------	.82	2.5	0	429	.4	--	.000	618	279	279	1.0	1.0	963	3.70	8	--	1V	--	--
Sept. 28-Oct. 1----	.40	1.6	0	389	.2	--	.001	601	256	256	1.1	1.1	910	3.60	6	--	8Ch	--	--
Oct. 5-8-----------	.25	2.0	0	369	.3	--	1.11	554	245	245	.7	.7	832	3.85	15	--	8Ch	--	--
Oct. 12-14---------	.55	1.8	0	378	.2	--	--	556	240	240	.7	.7	847	3.80	15	--	--	--	--
Oct. 19-22---------	.31	1.9	0	389	.3	--	.113	593	248	248	.8	.7	884	3.90	15	--	32Ch	--	--
Oct. 26-29---------	.49	1.4	0	277	.2	--	.000	414	177	177	.9	.8	679	3.70	10	--	2D	--	--
Nov. 2-5-----------	.07	.86	4	154	.2	--	.002	238	114	111	.5	.2	378	4.7	4	--	1E	--	--
Nov. 9-12----------	.12	.97	0	154	.2	--	.001	240	103	103	.3	.3	378	4.35	6	--	2Dm	--	--
Nov. 16-19---------	.12	1.1	0	174	.2	.013	.009	264	a123	a123	.4	.6	437	4.20	a9	16Ch	8Ch	--	--
Nov. 23-26---------	.10	.81	0	170	.1	.019	.028	264	a128	a128	.4	.4	394	4.25	a9	32Ch	32Ch	--	--
Nov. 30-Dec. 3-----	.26	.78	2	96	.1	.011	.013	180	a90	a88	.1	.1	249	4.9	a44	4Ch	8Ch	--	--
Dec. 7-10----------	.20	.51	4	68	.1	--	.010	114	80	57	.1	.0	186	5.5	7	--	8Ch	--	--

a Average of analyses of individual daily samples of the composite period.

CASSELMAN RIVER AT HARNEDSVILLE, PA.

LOCATION.--At highway bridge on route 53, Harnedsville, Somerset County, approximately 3 miles upstream from Confluence, Pa.
DRAINAGE AREA.--382 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1950.
Water temperatures: October 1949 to September 1950.
EXTREMES, 1949-50.--Dissolved solids: Maximum, 233 ppm Oct. 1-10; minimum, 71 ppm Jan 1-12.
Hardness: Maximum, 143 ppm Oct. 1-10; minimum 40 ppm Dec. 11-20, 21-31.
Specific conductance: Maximum, 369 micromhos Oct. 1-10; minimum, 114 micromhos Dec 11-20.
Water temperatures: Maximum, 76°F Aug. 17; minimum, freezing point many days during winter months.
REMARKS.--Discharge records for gaging station at Markelton for water year October 1949 to September 1950 given in Water-Supply Paper 1173.

Chemical analyses, in parts per million, water year October 1949 to September 1950

Date of collection	Mean discharge (second-feet)	Temperature (°F)	Color	pH	Specific conductance (micromhos at 25°C)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Total acidity as H_2SO_4
Oct. 1-10, 1949	68		5	4.10	369	7.3	2.5	0.05	1.0	34	9.4	4.2	2.1	0	144	3.8	0.2	1.9	233	143	143	30
Oct. 11-20	112		5	4.20	308	6.8	2.0	.03	.8	29	9.2	4.3	2.4	0	119	2.9	.2	1.1	193	128	128	21
Oct. 21-31	133		5	4.35	270	6.8	1.8	.02	.9	25	9.0	3.4	1.8	0	104	2.2	.1	1.3	170	111	111	17
Nov. 1-10	330		5	5.0	148	7.0	--	.03	.35	14	4.5	2.3	1.7	2	50	2.0	.0	2.0	95	53	52	--
Nov. 11-20	220		5	4.5	176	6.8	--	.02	.40	16	5.5	2.4	1.4	0	61	1.5	.0	1.7	108	62	62	7
Nov. 21-30	541		5	4.5	158	6.6	--	.02	.30	14	4.6	2.0	1.3	0	52	2.2	.0	2.6	94	54	54	6
Dec. 1-10	587		5	5.1	120	6.8	--	.02	.30	11	3.5	1.6	1.1	2	38	1.5	.0	2.9	74	42	40	--
Dec. 11-20	1,101		5	5.2	114	6.6	--	.07	--	10	3.7	1.4	1.1	1	38	1.5	.0	3.2	72	40	39	--
Dec. 21-31	1,172		5	5.5	116	8.1	--	.07	.15	10	3.7	1.8	.9	2	37	1.2	.0	3.6	78	40	38	--
Jan. 1-12, 1950	1,675		5	4.8	120	6.0	.3	.04	.2	11	3.7	1.6	.6	4	40	2.0	.0	2.3	71	42	39	--
Jan. 13-20	829		5	4.10	164	6.5	1.4	.05	.4	14	5.4	2.0	1.2	0	63	1.0	.1	3.3	99	57	57	19
Jan. 21-30	603		1	4.10	182	6.2	1.6	.07	.5	14	5.4	1.7	1.2	0	60	1.0	.0	3.5	101	57	57	18
Jan. 31, Feb. 1-3	3,000		5	5.5	93.1	--	--	--	--	--	--	1.9		3	35	2.0	--	3.2	--	32	30	--
Feb. 4-10	1,780		25	4.06	170	6.5	1.6	.08	.4	11	2.7	1.8	.7	0	50	1.0	.0	3.5	83	39	39	22
Feb. 11-20	1,820		5	4.05	170	6.5	1.3	.06	.4	12	2.8	1.5	1.0	0	51	.5	.0	3.2	84	41	41	19
Feb. 21-28	940		3	3.80	216	7.0	1.7	.08	.4	13	4.0	2.2	1.4	0	66	.8	.1	4.3	104	49	49	27
Mar. 1-10	608		1	3.70	238	7.3	.8	.04	.6	15	5.2	1.8	1.0	0	71	.8	.1	3.1	109	59	59	27
Mar. 11-12, 15-20	1,163		1	3.80	183	7.3	.7	.04	.5	12	4.0	1.8	.8	0	55	.6	.1	4.0	88	46	46	19
Mar. 13-14	3,456		5	4.7	92.4	--	--	--	--	--	--	2.4		1	32	2.0	--	1.6	--	32	32	--
Mar. 21-31	2,815		1	4.00	147	6.2	.6	.04	.5	11	3.5	1.1	1.5	0	45	.9	.1	3.2	73	42	42	15
Apr. 1-10	920		1	3.70	230	7.0	.6	.08	.4	14	4.8	1.1	.9	0	68	.5	.1	2.1	104	55	55	27
Apr. 11-20	443		1	3.60	262	7.0	2.5	.20	.7	16	3.8	1.2	.9	0	81	2.0	.1	1.8	123	56	56	33
Apr. 21-24, 28-30	886		1	3.70	211	7.9	2.0	.08	.6	14	2.8	3.2		0	67	3.0	.1	2.2	108	46	46	26
Apr. 25-27	2,760		5	4.7	90.1	--	--	--	--	--	--	2.2		1	31	2.0	--	2.4	--	33	33	--
May 1-10	856		5	4.10	160	7.2	.5	.21	.3	13	3.4	1.3	1.1	0	54	1.8	.1	2.2	88	46	46	12
May 11-20	848		5	4.00	190	7.4	.7	.21	.5	14	3.8	1.4	1.0	0	60	1.8	.1	1.8	98	51	51	29
May 21-31	1,006		5	4.35	136	7.2	.3	.20	.3	12	3.0	1.2	1.0	0	44	1.8	.1	1.9	77	42	42	13
June 1-10, 1950	800		5	4.20	170	7.6	0.6	0.10	0.5	14	3.8	1.2	0.9	0	58	1.5	0.0	1.8	96	51	51	16
June 11-20	433		5	4.10	200	7.8	.7	.10	.6	16	4.3	1.3	1.1	0	66	1.8	.0	4.1	110	58	58	21
June 21-30	366		30	4.06	191	7.8	.6	.04	--	16	5.9	1.2	1.2	0	67	1.4	.0	2.2	117	64	64	30
July 1-10	177		40	3.60	320	8.3	3.5	.06	--	23	4.9	2.4	1.2	0	107	1.5	.0	3.0	183	78	78	39
July 11	432		--	3.70	297	5.4	2.6	--	--	21	7.1	1.2	2.2	--	90	3.0	--	3.0	--	82	82	36
July 13-20	296		0	4.30	188	5.2	1.2	.02	--	17	5.6	1.9	1.5	0	73	2.9	.1	3.0	115	66	66	15
July 21-31	172		0	4.40	224	11	1.4	.01	.00	22	6.9	2.8	1.4	--	89	4.1	.1	3.0	147	83	83	18
Aug. 1-10	178		0	4.10	220	5.2	1.5	.02	.90	19	6.5	1.9	1.4	--	85	2.8	.1	2.2	133	74	74	[illegible]
Aug. 11-20	110		0	3.80	330	5.6	2.6	.04	1.0	28	9.7	3.1	1.5	--	127	3.5	.1	2.4	193	110	110	29
Aug. 21-31	107		0	3.80	314	5.7	1.1	.07	1.5	26	8.3	2.6	1.9	--	116	3.5	.1	2.2	185	99	99	28
Sept. 1-10	116		0	4.10	290	6.2	2.0	.03	.95	28	9.5	3.4	2.0	--	120	3.4	.2	2.4	185	109	109	26
Sept. 11-21	145		0	3.80	353	5.5	2.5	.02	1.2	31	10	3.5	1.8	--	135	4.2	.2	2.2	210	118	118	33
Sept. 22-24	2,706		0	5.2	93.9	5.1	.3	.08	.08	9.0	2.8	.8	1.9	2	37	2.2	.0	2.9	66	34	32	--
Sept. 25-30	349		0	4.10	191	6.2	1.6	.03	.02	17	5.7	1.2	1.3	0	74	2.4	.1	2.7	110	66	66	30
Average	883		5	4.35	200	6.8	1.3	0.07	0.5	17	5.5	2.0	1.3	--	78	2.0	0.1	2.5	121	65	65	22

157 YOUGHIOGHENY RIVER AT SUTERSVILLE, PA.

LOCATION.--At gaging station at bridge on State Highway 31, approximately 2 miles downstream from Sewickley Creek, Westmoreland County.
DRAINAGE AREA.--1,715 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1948.
EXTREMES, 1947-48.--Dissolved solids: Maximum, 563 parts per million Oct. 11-20; minimum, 68 parts per million May 4-10.
Total hardness: Maximum, 302 parts per million Oct. 1-10; minimum, 38 parts per million May 4-10.
REMARKS.--Samples collected from point about 75 feet from west (left) bank. Some differences in quality across river occur owing to influence of Sewickley Creek. Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa. Records of discharge for water year October 1947 to September 1948 given in Water-Supply Paper 1113.

Chemical analyses, in parts per million, water year October 1947 to September 1948

Date of collection	Mean discharge (second-feet)	Temperature (°F.)	Color	pH	Specific conductance (micromhos at 25° C.)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Non-carbonate	Total acidity as H_2SO_4
Oct. 1-10, 1947	357	58	4	3.20	1,040	8.2	5.5	0.76	1.4	58	21	45	3.2	0	381	7.1	0.2	1.2	549	302	302	110
Oct. 11-20	321	65	3	3.20	1,060	7.6	4.3	.62	1.4	59	22	49	3.8	0	393	7.5	.3	1.2	563	301	301	103
Oct. 21-31	398	58	2	3.30	876	7.0	3.5	.50	1.1	51	19	40	3.2	0	324	7.0	.4	1.2	468	256	256	81
Nov. 1-10	1,011	51	3	3.85	422	4.6	1.3	.06	62	28	9.4	20	3.5	0	159	4.8	.2	1.0	242	124	124	30
Nov. 11-20	1,963	43	3	4.45	221	4.6	.5	.02	.20	16	5.2	11	2.2	0	83	2.9	.1	2.0	133	66	66	9
Nov. 21-30	2,324	40	2	4.7	191	4.6	.2	.02	.25	15	4.4	10	2.2	1	69	3.0	.1	2.9	118	57	56	7
Dec. 1-10	1,766	38	3	4.30	264	4.8	.4	.05	.25	19	6.2	14	2.0	0	95	3.5	.1	2.6	156	78	78	11
Dec. 11-20	2,233	34	0	4.45	181	4.6	.2	.01	.31	14	4.3	9.6	1.6	0	65	3.4	.1	4.2	110	55	55	8
Dec. 21-31	1,077	33	2	3.90	317	5.3	.4	.01	.36	21	6.9	18	1.6	0	117	3.0	.1	2.4	189	90	90	14
Jan. 1-10, 1948	6,390	36	5	5.2	134	4.5	.1	.04	.17	13	3.6	4.1	1.8	3	45	3.0	.1	5.2	85	47	45	--
Jan. 11-20	2,368	--	0	5.0	171	3.8	.4	.02	.22	14	4.8	8.0	2.0	1	62	3.8	--	4.4	105	57	57	8
Jan. 21-31	1,365	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 1-10	902	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb. 11-20	7,082	--	0	5.5	146	4.7	--	.02	.08	14	4.2	4.3	1.4	4	48	3.0	.1	3.8	91	52	49	--
Feb. 21-29	6,141	40	1	5.1	130	4.9	--	.03	.11	11	3.4	4.8	1.1	4	45	2.4	.1	2.6	81	41	38	--
Mar. 1-10	5,459	38	0	5.2	133	4.5	--	.01	.21	12	3.6	4.8	1.0	4	46	2.5	.1	2.0	82	45	41	--
Mar. 11-20	3,330	41	0	4.9	188	4.2	.3	.01	.21	16	4.8	8.0	1.1	4	68	3.8	.1	2.0	116	62	58	5
Mar. 21-31	4,878	51	0	5.8	161	5.0	--	.04	.16	14	4.5	6.8	1.4	4	57	2.9	.0	3.4	102	53	50	--
Apr. 1-10	3,255	52	5	5.6	195	5.1	--	.03	.31	17	5.6	8.4	1.4	2	73	2.8	.0	2.7	124	65	64	--
Apr. 11-20	14,556	52	10	6.0	165	5.7	--	.18	.13	16	4.8	5.4	1.6	6	57	2.2	.0	3.4	106	60	55	--
Apr. 21-30	4,153	56	0	4.6	218	5.6	1.0	.04	.38	18	6.1	7.4	1.4	0	83	2.2	.0	2.3	137	76	76	15
May 1-3	3,393	55	1	4.5	209	2.0	.5	.02	--	19	6.4	11	2.6	0	84	3.0	.4	3.4	138	77	77	10
May 4-10	8,834	55	3	6.0	108	4.1	--	.03	.00	10	3.1	4.1	1.2	4	36	2.0	--	3.1	68	38	34	--
May 11-20	3,825	58	1	4.7	170	4.6	.3	.01	.27	15	4.7	7.1	1.1	0	63	1.8	.3	2.5	107	59	59	9
May 21	3,240	58	--	3.35	911	--	--	.55	1.2	48	26	48		0	337	5.0	--	2.5	--	255	255	114
May 22-31	2,260	61	1	4.15	254	5.2	.1	.02	.40	19	6.3	9.4	1.9	0	95	2.0	.2	1.9	151	78	78	20
June 1-10, 1948	2,150	62	1	4.20	274	4.9	0.1	0.03	0.43	19	6.6	12	1.4	0	103	2.4	0.2	1.8	164	79	79	20
June 11-20	4,480	63	3	4.7	155	4.6	.4	.03	.26	12	4.0	6.5	1.3	0	56	2.1	.2	1.8	96	49	40	9
June 21-30	3,619	68	25	5.4	175	4.4	.2	.03	.1	18	4.2	6.7	1.4	3	64	7.5	.1	3.0	111	63	61	--
July 1-3	1,840	69	15	4.3	253	4.8	.5	.06	.2	22	6.8	10		0	99	3.2	.1	3.4	156	88	88	14
July 4-10	5,994	69	10	5.4	127	2.4	.0	.03	.1	14	3.1	7.6	1.7	3	50	4.5	.1	3.5	78	48	45	--
July 11-20	3,217	74	5	5.5	180	4.4	--	.03	.10	17	6.5	4.8	1.8	6	65	3.2	.1	3.5	114	69	64	--
July 21, 27	2,780	72	10	3.50	499	--	--	.26	--	30	21	2.3		0	162	8.0	--	4.1	--	178	178	52
July 22-26, 28-31	2,527	73	5	5.2	178	4.3	.6	.02	.15	15	5.6	6.8	3.2	6	67	2.5	.1	2.8	113	64	58	--
Aug. 1-10	1,932	70	5	4.8	219	4.1	6	.03	.23	18	5.5	8.6	2.4	4	83	3.0	.1	3.3	136	71	68	13
Aug. 11-20	1,638	71	10	4.6	232	3.7	6	.03	.25	19	6.0	9.9	2.4	2	87	2.8	.1	3.9	144	76	74	13
Aug. 21-31	1,351	75	5	4.2	266	4.1	1.1	04	.15	19	6.2	12	2.2	0	97	2.8	.1	3.6	150	82	82	16
Sept. 1-10	1,241	71	10	4.2	256	5.6	.6	00	1.1	19	4.9	13	1.0	0	95	1.8	.1	1.4	150	76	76	14
Sept. 11-20	1,157	--	15	4.2	260	5.5	.4	02	1.0	20	5.3	14	1.2	0	94	5.8	.1	1.1	150	79	79	44
Sept. 21-30	1,177	63	10	4.10	262	5.2	.4	02	1.2	21	6.0	11	1.3	0	95	3.8	.1	1.0	150	86	86	63
Average	3,130	55	5	--	295	4.8	--	0.10	0.4	21	7.4	13	1.9	2	108	3.6	0.1	2.7	150	92	91	--

157 YOUGHIOGHENY RIVER AT SUTERSVILLE, PA.

LOCATION.--At highway bridge, approximately 2 miles downstream from Sewickley Creek, Westmoreland County, and 500 feet downstream from gaging station at Sutersville.
DRAINAGE AREA.--1,715 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1949.
EXTREMES, 1948-49.--Specific conductance: Maximum, 296 micromhos Mar. 11-20; minimum, 121 micromhos Jan. 21-31.
Water temperatures: Maximum, 79°F July 6; minimum, 33°F Dec. 25-27.
EXTREMES, 1947-49.--Dissolved solids (1947-48): Maximum, 563 parts per million Oct. 11-20, 1947; minimum, 68 parts per million May 4-10, 1948.
Total hardness (1947-48): Maximum, 302 parts per million Oct. 1-10, 1947; minimum, 38 parts per million May 4-10, 1948.
Specific conductance: Maximum, 1,060 micromhos Oct. 11-20, 1947; minimum, 108 micromhos May 4-10, 1948.
Water temperatures: Maximum, 84°F July 16, 1948; minimum, freezing point on several days during winter months.
REMARKS.--Samples collected from point about 7[illegible] feet from west (left) bank. Some differences in quality across river occur owing to influence of Sewickley Creek. Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa. Records of discharge for water year October 1948 to September 1949 given in Water-Supply Paper 1143.

Chemical analyses, in parts per million, water year October 1948 to September 1949

Date of collection	Mean discharge (second-feet)	Temperature (°F)	Color	pH	Specific conductance (micromhos at 25°C)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total acidity as H_2SO_4
																				Total	Noncarbonate	
Oct. 1-10, 1948	1,327		10	4.20		4.3	0.5	0.02	1.1	20	4.7	13	1.4	0	92	3.8	0.1	1.3	149	77	77	41
Oct. 11-20	1,579		--	4.5	[illegible]	4.0	.6	.02	.65	17	5.2	10	1.0	--	79	1.8	.1	2.2	129	68	--	--
Oct. 21-31	1,207		5	4.6	[illegible]	--	--	.03	--	--	--	--	--	2	100	2	--	.4	--	--	--	--
Nov. 1-10	1,631		5	4.7	213	--	--	.02	--	--	--	--	--	2	76	6	--	.9	--	--	--	--
Nov. 11-20	1,659		5	4.8	200	--	--	.04	--	--	--	--	--	2	72	6	--	1.3	--	--	--	--
Nov. 21-30	2,921		5	5.3	160	--	--	.06	--	--	--	--	--	4	54	4	--	2.1	--	--	--	--
Dec. 1-10	3,022		5	5.4	149	--	--	.01	--	--	--	--	--	3	54	6	--	3.4	--	--	--	--
Dec. 11-20	8,314		5	5.5	125	--	--	.01	--	--	--	--	--	2	43	4	--	2.5	--	--	--	--
Dec. 21-31	4,989		5	4.9	151	--	--	.02	--	--	--	--	--	1	54	3	--	2.8	--	--	--	--
Jan. 1-10, 1949	5,669		5	5.3	137	--	--	.03	--	--	--	--	--	2	42	7	--	3.5	--	--	--	--
Jan. 11-14, 19, 20	3,762		5	4.6	142	5.3	.6	.02	.25	12	3.7	2.6		1	46	2	.1	3.5	81	49	48	26
Jan. 15-18	2,440		7	4.40	204	5.8	1.1	.04	.35	17	5.2	5.1		0	74	2	.1	3.2	120	72	72	53
Jan. 21-31	11,360		5	5.7	121	--	--	.02	--	--	--	--		4	38	2.5	.0	1.8	--	--	--	--
Feb. 1-10	6,385		10	4.7	130	--	--	.00	--	--	--	--		1	49	2	.1	3.2	--	--	--	--
Feb. 11-20	4,982		5	4.7	130	--	--	.00	--	--	--	--		0	51	2	.1	3.2	--	--	--	--
Feb. 21-28	6,560		5	5.6	124	--	--	.00	--	--	--	--		4	46	2	.1	2.8	--	--	--	--
Mar. 1-10	5,176		10	5.0	132	--	--	.00	--	--	--	--		5	56	1	.1	2.7	--	--	--	--
Mar. 11-20	3,685		10	5.0	187	--	--	.00	--	--	--	--		3	85	3	.1	2.7	--	--	--	--
Mar. 21-31	3,202		10	4.5	180	--	--	.02	--	--	--	--		0	68	4	.1	2.5	--	--	--	--
Apr. 1-10	4,246		5	5.2	154	6.0	--	.00	.20	13	4.3	6.6		2	56	2.4	.1	1.2	94	50	48	--
Apr. 11-20	2,494		5	4.9	188	--	--	.00	--	--	--	--		1	69	4	--	1.2	--	--	--	--
Apr. 21-30	2,524		10	5.4	184	--	--	.00	--	--	--	--		3	68	2	--	1.7	--	--	--	--
May 1-10	1,526		5	4.20	246	--	--	--	--	--	--	--		0	96	2.6	.1	1.4	--	--	--	14
May 11-20	1,288		3	3.90	296	--	--	--	--	--	--	--		0	110	2.6	.1	.6	--	--	--	18
May 21-31	2,212		3	4.30	218	--	--	--	--	--	--	--		0	83	2.2	.1	1.4	--	--	--	12
June 1-10	1,127		3	4.00	274	--	--	--	--	--	--	--		0	105	2.9	.1	.8	--	--	--	16
June 11, 13-20	1,241		1	3.95	285	--	--	.04	--	--	--	--		0	101	2	--	.7	--	--	--	16
June 12	1,120		1	4.6	149	--	--	--	--	--	--	--		0	51	1	--	2.2	--	--	--	4
June 21-30	1,339		5	4.20	253	--	--	.03	--	--	--	--		0	91	2	--	1.5	--	--	--	10
July 1-10	1,034		1	4.05	280	--	--	.04	--	--	--	--		0	102	2	--	1.1	--	--	--	13
July 11-20	1,469		4	4.15	252	--	--	.04	--	--	--	--		0	91	3	--	1.4	--	--	--	11
July 21-31	1,624		2	4.30	231	--	--	.02	--	--	--	--		0	84	2	.1	2.0	--	--	--	10
Aug. 1-10	1,507		4	4.35	217	--	--	--	--	--	--	--		0	87	4	--	1.6	--	--	--	10
Aug. 11-20	2,734		2	4.8	205	--	--	--	--	--	--	--		2	78	2	--	1.8	--	--	--	--
Aug. 21-31	1,796		1	4.40	218	--	--	--	--	--	--	--		0	85	2	--	1.6	--	--	--	10
Sept. 1-10	1,589		4	4.5	213	5.7	.3	.10	.40	17	5.5	9.5		0	80	2.5	.1	1.4	127	68	68	9
Sept. 11-20	1,219		5	4.10	227	--	--	--	--	--	--	--		0	83	2	--	1.0	--	--	--	8
Sept. 21-30	1,291		3	4.00	238	--	--	--	--	--	--	--		0	84	2	--	.8	--	63	63	9
Average	3,037		5	4.6	199	--	--	--	--	--	--	--		--	73	2.9	--	1.9	--	--	--	--

YC ENY AT S ILLE,

LOCA. ..--At highway bridge, approximately 2 miles downstream from Sev ey Creek, Westmoreland County, and 500 feet downstream from gag tation at Sutersville.
DRAINAGE AREA.--1,715 square miles (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1947 to September 1950.
EXTREMES, 1949-50.--Specific conductance: Maximum, 325 micromhos Aug. 23-25; minimum, 113 micromhos Feb. 1-10.
Hardness: Maximum, 74 ppm Sept. 1-10, 11-20; minimum, 40 ppm Feb. 1-10.
Water temperatures: Maximum, 75°F Aug. 28; minimum, freezing point Mar. 3.
EXTREMES, 1947-50.--Dissolved solids (1947-48): Maximum, 563 ppm Oct. 11-20, 1947; minimum, 68 ppm May 4-10, 1948.
Hardness (1947-50): Maximum, 302 ppm Oct. 1-10, 1947; minimum, 38 ppm May 4-10, 1948.
Specific conductance: Maximum, 1,060 micromhos Oct. 11-20, 1947; minimum, 108 micromhos May 4-10, 1948.
Water temperatures: Maximum, 84°F July 16, 1948; minimum, freezing point on many days during winter months.
REMARKS.--Samples collected from point about 75 feet from left bank. Some differences in quality in cross section owing to influence at Sewickley Creek. Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa. Records of discharge for water year October 1949 to September 1950 given in Water-Supply Paper 1173.

Chemical analyses, in parts per million, water year October 1949 to September 1950

Date of collection	Mean discharge (second-feet)	Temperature (°F)	Color	pH	Specific conductance (micromhos at 25°C)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Total acidity as H_2SO_4
Oct. 1-10, 1949	1,169		3	4.00	218							--		0	76	3		0.6		56	56	9
Oct. 11-20	1,093		3	4.10	247							--		0	85	3		1.1		66	66	15
Oct. 21, 22, 24-29	1,144		3	4.10	237							--		0	82	2		1.1		68	68	22
Oct. 23, 30, 31, Nov. 3, 7, 8, 10, 14	1,434		5	4.9	177							--		2	68	4		1.2		54	52	--
Nov. 1, 2, 4-6, 9	1,886		5	4.5	198							--		1	74	3		1.4		58	58	--
Nov. 12, 13, 15-20, 24, 26	1,641		2	4.30	225							--		0	82	1		1.0		60	60	13
Nov. 21-23, 25, 27-30	2,468		5	5.5	161							--		3	57	4		1.4		50	48	--
Dec. 1-10	2,430		5	5.4	154							--		4	54	2		1.9		48	45	--
Dec. 11-20	4,612		5	6.0	172							--		8	48	10		2.0		58	51	--
Dec. 21-31	4,298		5	6.2	138							--		5	46	3		1.8		47	43	--
Jan. 1-10, 1950	7,451		1	6.1	138							--		11	47	3		3.5		50	41	--
Jan. 11-20	4,797		2	5.9	136							--		4	48	2		3.2		46	43	--
Jan. 21-31	4,474		5	6.1	150							--		4	52	2		1.6		51	43	--
Feb. 1-10	10,139		5	6.0	113							--		4	38	2		1.3		40	37	--
Feb. 11-20	6,429		5	5.3	139							--		2	48	2		1.6		42	40	--
Feb. 21-28	5,044		5	4.9	149							--		1	52	1		1.4		48	47	--
Mar. 1-10	3,012		5	4.5	180							--		0	54	2		1.1		48	48	13
Mar. 11-20	6,668		5	5.0	118							--		3	41	1		3.2		41	38	--
Mar. 21-31	8,738		6	5.4	121							--		4	40	1		3.4		46	43	--
Apr. 1-10	3,828		6	4.8	171							--		1	60	2		2.4		62	60	--
Apr. 11-14, 17-24	1,848		--	4.20	273							--		0	88	2		2.8		74	74	17
Apr. 15-16	1,640		--	6.6	116							--		4	38	1		3.7		48	38	--
Apr. 25-28	8,060		--	5.5	8.8							--		4	39	2		3.4		42	38	--
Apr. 29, 30	4,110		8	4.00	236							--		0	82	4		2.8		66	66	19
May 1-10	4,122		2	4.6	144							--		4	51	3		2.0		41	38	--
May 11-20	2,780		3	4.30	191							--		0	73	2		3.1		54	54	12
May 21	2,340		--	3.66	273							--		0	101	3		4.1		78	78	21
May 22-31	2,658		1	4.35	168							--		0	61	2		3.1		52	52	8
June 1-10	3,966		2	4.9	144							--		4	52	3		1.9		46	43	--
June 11, 15, 16, 19, 20	2,064		2	4.30	219							--		0	78	2		2.2		66	66	11
June 12, 13, 14, 17, 18	2,100		5	4.9	141							--		2	51	1		2.0		46	44	--
June 21-23, 27-30	1,854		5	4.35	202							--		0	72	2		2.1		60	60	7
June 24-26	2,740		10	5.8	120							--		4	40	2		2.5		40	37	--
July 1	1,900		--	4.6	129							--		1	46	1		1.7		44	43	--
July 2-10	1,957		5	4.45	216							--		0	76	1		2.4		66	66	7
July 11-20	1,948		5	4.8	223							--		2	80	3		2.3		69	67	--
July 21-31	1,432		5	4.45	238							--		0	85	2		2.0		69	69	10
Aug. 1-10	1,529		1	4.25	231							11		0	83	1		1.6		63	63	10
Aug. 11-20	1,385		1	4.20	228							11		0	83	1		1.4		63	63	11
Aug. 21, 22, 26-31	1,095		1	4.25	241							11		0	87	1		1.5		67	67	19
Aug. 23-25	1,033		1	3.90	325							19		0	117	2		1.4		79	79	34
Sept. 1-10	1,124		0	4.25	272							--		0	103	3		1.7		74	74	8
Sept. 11-20	1,422		0	4.05	289							--		0	107	4		1.7		74	74	12
Sept. 21, 23, 24, 26-30	3,124		0	4.30	254							--		0	93	4		2.3		69	69	9
Sept. 22, 25	6,945		--	6.2	160							--		6	53	2		2.2		53	46	--
Average	3,359		4	4.8	188							--		2	67	2		2.1		58	54	12

16D

YOUGHIOGHENY RIVER AT McKEESPORT, Pa.

LOCATION.--At base of 15th Street Bridge in McKeesport, Allegheny County, site of raw-water intake for McKeesport Water Works, approximately 1¼ miles from junction of Monongahela and Youghiogheny River.
DRAINAGE AREA.--1,732 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1957.
Water temperatures: October 1956 to September 1957.
EXTREMES, 1956-57.--Hardness: Maximum, 172 ppm June 1-9; minimum, 52 ppm Feb. 1-17.
Specific conductance: Maximum daily, 782 micromhos Aug. 21; minimum daily, 162 micromhos Feb. 3.
Water temperatures: Maximum daily, 83°F July 22.
REMARKS.--Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Temperature (°F)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total acidity (H^{+1})	Specific conductance (micromhos at 25°C)	pH	Color
																	Calcium, magnesium	Noncarbonate				
Oct. 1-10, 1956			6.1	2.3	0.00	0.57	32	7.6	28	1.8	0	169	6.0	0.1	1.3	274	127	127	0.2	430	4.30	3
Oct. 11-20			--	--	--	.52	--	--	--	--	0	174	6.0	--	1.1	--	116	116	.2	451	4.35	1
Oct. 21-31			--	--	--	.62	--	--	--	--	0	203	6.0	--	1.0	--	133	133	.2	519	4.15	2
Nov. 1-10			--	--	--	--	--	--	--	--	0	184	5.9	--	3.3	--	118	118	.2	460	4.30	2
Nov. 11-20			--	--	--	--	--	--	--	--	0	188	5.5	--	1.9	--	116	116	.3	480	4.10	1
Nov. 21-30			--	--	--	--	--	--	--	--	0	154	5.8	--	1.8	--	94	94	.4	392	4.20	3
Dec. 1-4			--	--	--	--	--	--	--	--	0	176	4.1	--	2.4	--	110	110	.2	455	4.20	1
Dec. 14, 24, 25, 28			--	--	--	--	--	--	15		15	81	4.6	--	4.0	--	74	62	--	234	6.7	1
Jan. 2, 5, 10, 1957			--	--	--	--	--	--	17		9	104	4.6	--	4.3	--	88	81	--	276	6.5	1
Jan. 16, 18, 20			--	--	--	--	--	---	18		6	106	4.3	--	3.2	--	84	79	--	272	6.0	2
Jan. 21-31			--	--	--	--	--	--	16		6	84	4.2	--	3.2	--	65	60	--	209	6.2	2
Feb. 1-17			--	--	--	--	--	--	14		5	68	4.0	--	3.8	--	52	46	--	184	5.9	2
Feb. 18-25			--	--	--	--	--	--	13		2	85	4.2	--	2.8	--	70	68	--	223	5.1	3
Mar. 1-19			--	--	--	--	--	--	20		4	113	5.2	--	2.8	--	88	84	--	286	5.8	4
Mar. 20-Apr. 2			--	--	--	--	--	---	26		1	136	6.0	--	3.4	--	98	97	--	341	4.6	1
Apr. 3-11			--	--	--	--	--	--	14		11	82	4.2	--	3.6	--	74	65	--	229	6.1	3
Apr. 15-25			--	--	--	--	--	--	18		7	118	4.7	--	3.0	--	98	92	--	303	5.9	2
Apr. 30-May 7			--	--	--	--	--	--	31		2	161	6.4	--	2.0	--	112	110	--	378	5.0	4
May 8-13			--	--	--	--	--	--	--	--	0	248	8.2	--	1.5	--	164	164	.3	589	4.00	4
May 15-25, 27, 28, 30, 31			--	--	--	--	--	--	--	--	0	208	6.1	--	3.0	--	128	128	.4	502	3.90	3
June 1-9, 1957			--	--	--	--	--	--	--	--	0	303	7.4	--	2.1	--	172	172	0.5	695	3.55	3
June 10-19			--	--	--	--	--	--	--	--	0	184	6.4	--	4.1	--	124	124	.1	430	4.05	3
June 20, 22, 24, 30-July 6, 8			9.7	0.7	0.03	0.77	38	12	44	2.0	0	232	8.0	0.2	2.4	344	153	153	0.5	578	3.00	2
July 9-12			--	--	--	--	--	--	--	--	0	196	6.3	--	3.4	--	--	--	.2	457	4.10	3
July 13, 15, 27, 29-Aug. 3, 5, 11			--	--	--	--	--	--	--	--	0	257	7.5	--	2.5	--	144	144	.4	624	3.60	3
Aug. 12-26, 28-30-Sept. 1-6, 8-10			--	--	--	--	--	--	--	--	0	282	7.7	--	3.0	--	150	150	.5	671	3.60	3
Sept. 11-28			--	--	--	--	--	--	--	--	0	257	6.9	--	2.1	--	146	146	.4	618	3.70	3
Weighted average			--	--	--	--	--	--	--	--	2	178	5.9	--	2.7	--	114	113	--	438	--	3

YOUGHIOGHENY RIVER AT McKEESPORT, PA.

LOCATION.--At base of 15th Street Bridge in McKeesport, Allegheny County, at site of raw-water intake of McKeesport Water Works, approximately 1¼ miles from junction of Monongahela and Youghiogheny Rivers.

DRAINAGE AREA.--1,732 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1956 to September 1958.
Water temperatures: October 1956 to September 1958.

EXTREMES, 1957-58.--Hardness: Maximum, 134 ppm Oct. 11-13, 15-18, 20-26; minimum, 54 ppm Apr. 6-10, 12-17.
Specific conductance: Maximum daily, 758 micromhos June 6; minimum daily, 144 micromhos Apr. 7.
Water temperatures: Maximum, 78°F July 2, 3, 5, 11; minimum, 34°F on several days during January and February.

EXTREMES, 1956-58.--Hardness: Maximum, 172 ppm June 1-9, 1957; minimum, 52 ppm Feb. 1-17, 1957.
Specific conductance: Maximum daily, 782 micromhos Aug. 21, 1957; minimum daily, 144 micromhos Apr. 7, 1958.
Water temperatures: Maximum, 83°F July 22, 1957; minimum, 33°F Jan. 20, 1957.

REMARKS.--Records of specific conductance and pH of daily samples available in district office at Philadelphia, Pa.

Chemical analyses, in parts per million, water year October 1957 to September 1958

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Total acidity as H^{+1}	Specific conductance (micromhos at 25°C)	pH	Color
																Calcium, magnesium	Noncarbonate				
Oct. 4-7, 1957		7.4	0.8	0.12	0.93	37	18	56	2.0	0	270	8.5	--	1.7	444	133	133	0.5	685	3.55	3
Oct. 11-13, 15-18 20-26		--	--	--	--	--	--	--	--	0	257	3.2	--	1.3	--	134	134	.6	653	3.40	2
Oct. 30-Nov. 6, 8-10		--	--	--	--	--	--	--	--	0	230	5.7	--	1.1	--	122	122	.5	589	3.35	2
Nov. 11-15, 17		--	--	--	--	--	--	--	--	0	197	5.4	--	1.4	--	104	104	.4	487	3.50	2
Nov. 18-27		--	--	--	--	--	--	--	--	0	147	11	--	1.4	--	91	91	.2	338	4.05	5
Nov. 28, 30, Dec. 7		--	--	--	--	--	--	--	--	0	196	6.2	--	.7	--	102	102	.2	437	3.95	5
Dec. 8-9		--	--	--	--	--	--	--	--	2	83	4.0	--	--	--	64	63	--	184	5.7	5
Dec. 11-13, 15-20		--	--	--	--	--	--	19	--	3	99	5.8	--	5.0	--	76	74	--	255	5.8	3
Dec. 21, 23-26, 29-31-Jan. 1-3, 1958		--	--	--	--	--	--	12	--	4	79	5.2	--	5.0	--	70	67	--	219	6.4	3
Jan. 5-10, 12-15		--	--	--	--	--	--	19	--	1	102	5.0	--	4.1	--	77	76	--	259	4.8	3
Jan. 11		--	--	--	--	--	--	--	--	0	92	5.0	--	2.2	--	78	76	--	338	3.70	3
Jan. 16-Feb. 4		6.4	--	.01	.24	22	3.4	14	1.4	4	101	5.8	0.1	5.2	197	82	78	--	256	6.0	4
Feb. 5-14, 16-19, 21-26, 1958		--	--	--	--	--	--	25	--	3	130	7.9	--	3.8	--	98	96	--	322	5.7	3
Feb. 27-Mar. 7		6.2	--	0.01	0.25	20	5.7	9.9	1.5	7	79	5.6	0.0	5.6	187	74	69	--	218	6.6	4
Mar. 8-14		--	--	--	--	--	--	10	--	4	77	5.0	--	4.5	--	72	69	--	226	6.0	3
Mar. 15-26		--	--	--	--	--	--	14	--	1	107	6.5	--	5.0	--	96	95	--	288	5.5	3
Mar. 27-Apr. 5		--	--	--	--	--	--	9.7	--	3	37	4.2	--	3.2	--	61	59	--	191	5.5	5
Apr. 6-10, 12-17		6.6	--	.01	.26	15	3.9	7.8	1.2	4	62	3.2	.2	3.5	121	54	51	--	168	6.4	3
Apr. 18-28		--	--	--	--	--	--	15	--	2	97	5.0	--	2.7	--	79	78	--	264	5.3	3
Apr. 29-May 7		--	--	--	--	--	--	10	--	8	67	4.2	--	3.0	--	62	56	--	185	6.1	4
May 8-16		--	--	--	--	--	--	9.2	--	11	38	3.4	--	4.3	--	66	57	--	189	6.5	5
May 17-25		--	--	--	--	--	--	--	--	0	139	4.1	--	3.0	--	108	108	0.1	339	4.45	2
May 26-30		--	--	--	--	--	--	--	--	0	219	6.0	--	2.7	--	170	170	.4	518	4.05	3
May 31-June 20		--	--	--	--	--	--	--	--	0	273	7.5	--	2.7	--	200	200	.4	648	3.85	2
June 21, 23-27, 29-30, July 1-12		--	--	--	--	--	--	--	--	0	173	5.1	--	3.3	--	140	140	.2	421	4.30	2
July 13-18		--	--	--	--	--	--	24	--	9	13[illegible]	4.6	--	3.6	--	110	103	--	332	6.8	3
Aug. 9-14, 16-17		--	--	--	--	--	--	22	--	2	121	6.3	--	2.1	--	90	89	--	296	5.0	3
Aug. 18-25, 28-29		--	--	--	--	--	--	--	--	1	163	6.6	--	2.4	--	106	105	.1	374	4.7	4
Aug. 30-31, Sept. 1 3-12, 14-16		9.8	0.3	.00	.26	29	11	31	2.0	0	168	7.0	.1	2.7	--	118	118	.2	401	4.5	3
Sept. 17-20		--	--	--	--	--	--	--	--	0	205	6.2	--	1.2	--	118	118	.3	502	3.95	3
Sept. 22, 26-30		--	--	--	--	--	--	32	--	3	157	7.0	--	2.7	--	108	106	--	360	5.7	2
Weighted average		--	--	--	--	--	--	--	--	--	145	5.9	--	3.3	--	103	102	--	361	--	3

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MONONGAHELA RIVER AT HAYS, PA.

LOCATION.--At Glenwood Bridge at Hays, Allegheny County, 5.2 miles downstream from gaging station at Braddock, and at mile 6.0.
DRAINAGE AREA.--7,337 square miles at gaging station.
RECORDS AVAILABLE.--Chemical analyses: July to December 1959.
REMARKS.--The 1959 national steel strike (July 15 to Nov. 7, 1959) was in effect during most of the sampling period. Daily samples were collected Monday through Thursday each week. Analyses for phenol, threshold odor, and oxygen consumed were made on samples collected on Tuesdays and Thursdays. Threshold odor code symbols are those given in American Public Health Association, 1960 Standard methods for the examination of Water and Wastewater, 11th ed., p. 255.

Chemical analyses, in parts per million, July to December 1959

Date	Iron (Fe)	Manganese (Mn)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Fluoride (F)	Phenols as C_6H_5OH (Tuesday)	Phenols as C_6H_5OH (Thursday)	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Acidity (H^+)		Specific conductance (micromhos at 25° C)	pH	Turbidity	Threshold odor (Tuesday)	Threshold odor (Thursday)	Oxygen consumed (Tuesday)	Oxygen consumed (Thursday)
									Calcium, magnesium	Noncarbonate	Immediate	Potential free							
July 21-23, 1959---	0.05	1.3	0	284	0.4	0.000	0.001	458	a197	a197	0.2	0.2	657	4.5	a1	2	4	--	--
July 27-30---------	.10	1.6	0	324	.4	.002	.002	484	a206	a206	.6	.6	703	4.10	a4	1	4Ds	1	2
Aug. 3-6-----------	.18	1.4	0	282	.3	.001	.004	434	a193	a193	.6	.5	680	4.00	a3	8Ds	16Ds	2	2
Aug. 10-13---------	.22	1.6	0	327	[illegible]	.001	.003	480	a202	a202	.8	.6	741	3.75	a6	4Ds	4Ds	2	1
Aug. 17-18---------	.27	1.7	0	344	.4	.003	b.006	516	a224	a224	1.0	.8	780	3.85	a4	4Ds	--	2	--
Aug. 24-27---------	.08	1.8	0	290	.4	.008	.010	444	a203	a202	.3	.2	658	4.40	a4	8Ds	16Ds	2	2
Aug. 31-Sept. 3----	.13	1.5	0	309	.2	.002	.003	474	a204	a204	.5	.4	704	3.85	a6	4Ds	4Ds	3	3
Sept. 7-10---------	.13	1.5	0	317	.5	--	.003	485	206	206	.5	.4	718	3.95	2	--	8Ds	--	--
Sept. 16-17--------	.21	1.6	0	328	.2	--	.003	534	216	216	.5	.4	730	4.00	7	--	8Ds	--	--
Sept. 21-24--------	.25	1.9	0	349	.4	--	.003	519	227	227	.5	.4	793	4.15	5	--	8Ds	--	--
Sept. 28-Oct. 1----	.06	.93	0	306	.2	--	.003	489	205	205	.4	.4	706	4.40	2	--	4Ds	--	--
Oct. 5-8-----------	.19	1.7	0	299	.2	--	.000	456	205	205	.5	.5	695	4.00	8	--	4Ds	--	--
Oct. 12-14---------	.05	1.6	0	273	.2	--	--	401	194	194	.3	.2	624	4.45	2	--	--	--	--
Oct. 19-22---------	.02	1.4	0	288	.1	--	.003	446	191	191	.4	.5	668	4.25	6	--	64Ds	--	--
Oct. 26-29---------	.31	1.2	0	244	.2	--	.000	394	158	158	.8	.8	603	3.75	10	--	4C	--	--
Nov. 2-5-----------	.08	.70	2	124	.1	--	.053	194	94	92	.2	.2	312	4.6	5	--	8Ch	--	--
Nov. 9-12----------	.35	.88	6	140	.2	--	.030	228	102	97	.1	.1	341	5.3	4	--	256Ch	--	--
Nov. 16-19---------	1.8	.95	2	158	.2	.006	.012	245	a118	a114	.2	.2	392	5.1	a9	128Ch	4Cm	--	--
Nov. 23-26---------	.27	1.2	0	170	.2	.017	.021	281	a134	a132	.2	.2	423	4.6	a12	16Ch	16Ch	--	--
Nov. 30-Dec. 3-----	.11	.74	4	91	.1	.010	.014	164	a87	a82	.1	.1	241	5.9	a24	4Ch	4Ds	--	--
Dec. 7-10----------	.77	.61	8	89	.1	--	.035	157	78	72	.1	.1	244	6.2	20	--	32Ch	--	--

a Average of analyses of individual daily samples of the composite period.
b Aug. 20, 1959 sample.

APPENDIX D

Partial Records and Miscellaneous Chemical Analyses of Streams

Chemical analyses of surface waters of the Tygart Valley ~~River~~ basin
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
1 TYGART VALLEY RIVER NEAR DAILEY, WEST VIRGINIA															
7/11/63	3.0				44	4.0	1.5		0.3	53	37	1	0.0	89	7.3
2 TYGART VALLEY RIVER ABOVE ELKINS, WEST VIRGINIA															
5/10/63					26	8.4	1.0		.6		23	6	.0	61	6.6
3 TYGART VALLEY RIVER BELOW ELKINS, WEST VIRGINIA															
9/30/60			0.78	0.32	38	7.0	2.5	0.1	2.2		36	5		96	6.4
4/19/61			.25	.00	21	8.6	1.5	.1	1.2		23	6		58	6.9
5/10/63					26	7.6	3.0		1.0		24	2	.0	63	6.5
5 LEADING CREEK AT GILMAN, WEST VIRGINIA															
5/10/63					10	10	1.0		.3		11	4	.0	36	6.4
7/10/63	4.4				13	6.4	2.0		.4	31	14	4	.0	44	6.9
6 ROARING CREEK AT COALTON, WEST VIRGINIA															
8/13/63	1.2	27	72	4.2	0	760	12				368	368	8.6	1,660	2.75
7 ROARING CREEK NEAR NORTON, WEST VIRGINIA															
8/14/63		8.4	2.8	4.8	0	210	5.0			290	114		2.0	656	3.10
8 GRASSY RUN NEAR NORTON, WEST VIRGINIA															
8/13/63	1.0	30	117	4.4	0	960					448	448	11	1,960	2.75
8/14/63		33	62	5.4	0	900	7.0			1,400	450		10	1,880	2.60
9 TYGART VALLEY RIVER AT BELINGTON, WEST VIRGINIA															
9/30/60	2.6		.28	.14	9	62	2.0	.2	.2	102	65	58		167	6.1
4/19/61	4.6	.3	1.6	.20	1	34	2.5	.1	.5	55	32	31	.1	94	4.8
5/10/63					2	54	1.0		.1		54	40	.1	120	5.4

Chemical analyses of surface waters of the Tygart Valley River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH	H+		
11 MIDDLE FORK RIVER AT AUDRA, WEST VIRGINIA															
9/30/60			0.07	0.14	2	8.8	1.5	0.1	0.3		9	8		30	5.8
4/19/61		0.1	.17	.05	3	8.0	.5	.1	.8		8	6	0.0	23	5.8
5/10/63					5	7.6	1.6		.1		7	3	.0	25	6.2
12 BUCKHANNON RIVER AT TENERTON, WEST VIRGINIA															
5/10/63					8	11	2.0		.2		11	4	.0	41	6.8
13 BUCKHANNON RIVER NEAR BUCKHANNON, WEST VIRGINIA															
5/10/63					8	16	1.0		.2		14	8	.0	49	6.3
15 BUCKHANNON RIVER AT HALL, WEST VIRGINIA															
9/30/60					3	25	1.5	.1	.7		25	22		77	5.8
4/19/61			.37	.10	5	15	1.0	.1	1.1		16	12		47	6.1
5/10/63					7	16	2.0		.3		16	10	.0	52	6.6
17 TYGART VALLEY RIVER AT PHILIPPI, WEST VIRGINIA															
9/30/60	2.9		.26	.08	1	38	2.0	.2	.4	64	40	39		111	6.3
4/19/61	4.0	.0	.36	.07	3	22	.5	.1	.9	38	23	20	.0	65	5.8
5/10/63					6	26	2.0		.2		26	21	.0	81	6.4
21 TYGART VALLEY RIVER AT COLFAX, WEST VIRGINIA															
6/23/52	3.8		.02		2	29	2.0	.0	.6	54	29	27		87	6.9
9/30/60	4.6		.25	.28	2	35	1.5	.2	.9	58	36	34		102	5.5
4/20/61	4.1	.0	.45	.20	2	22	1.5	.1	1.0	38	22	21	.0	69	6.0
5/9/63	4.3	.9	.19	.08	0	43	2.4	.1	.2	81	38	38	.2	130	4.7
7/9/63	4.6				5	30	3.0	.0	.6	60	28	24	.0	87	6.6

Chemical analyses of surface waters of the West Fork River basin
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
24 WEST FORK RIVER AT BENDALE, WEST VIRGINIA															
5/9/63					24	48	5.0		0.3		50	30	0.0	138	7.0
25 STONECOAL CREEK AT WESTON, WEST VIRGINIA															
5/9/63					5	126	12		.1		129	125	.0	332	5.4
26 WEST FORK RIVER AT BUTCHERVILLE, WEST VIRGINIA															
9/30/60			0.23	0.43	18	89	8.0	0.3	4.7		105	90		273	6.0
4/20/61			.83	.54	18	50	4.0	.1	.8		62	47		154	6.7
5/9/63					22	81	8.0		1.7		78	60	.0	212	6.3
27 KINCHELOE CREEK NEAR JACKSONS MILLS, WEST VIRGINIA															
8/15/63	10	0.0	.55	.00	55	58	.0				96	51		220	7.5
28 HACKERS CREEK NEAR GOOD HOPE, WEST VIRGINIA															
8/15/63	5.9	.1	.89	.00	18	152	7.5				156	141		386	7.0
29 ISAACS CREEK AT GOOD HOPE, WEST VIRGINIA															
8/15/63	7.9	.0	.48	.06	98	195	2.5				238	158		548	7.7
30 DUCK CREEK NEAR WEST MILFORD, WEST VIRGINIA															
8/15/63	7.8	.1	.07	.11	8	820	5.0				628	622	.0	1,430	6.3
31 LEFT FORK BUFFALO CREEK NEAR WEST MILFORD, WEST VIRGINIA															
8/15/63	12	.1	.27	.00	120	272	2.5				354	255		739	7.8
32 BUFFALO CREEK NEAR WEST MILFORD, WEST VIRGINIA															
8/15/63	2.9	.1	.06	.00	65	330	1.2				328	275		727	7.4
33 LOST CREEK AT WEST MILFORD, WEST VIRGINIA															
8/15/63	8.6	4.0	1.2	13	0	630	14				478	478	.8	1,230	3.80
34 SYCAMORE CREEK NEAR CLARKSBURG, WEST VIRGINIA															
8/15/63	7.9	.1	.63	.00	118	660	1.2				507	510		1,300	7.6

Chemical analyses of surface waters of the West Fork River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
35 COBURNS CREEK NEAR CLARKSBURG, WEST VIRGINIA															
8/14/63	7.7	0.1	0.11	0.00	115	480	2.5				468	374		1,030	8.0
36 WEST FORK RIVER NEAR CLARKSBURG, WEST VIRGINIA--ABOVE BROWNS CREEK															
8/14/63		.1	1.3	.00	50	150	4.0			226	145			365	6.8
37 BROWNS CREEK NEAR CLARKSBURG, WEST VIRGINIA															
8/13/63		13	55	4.1	0	820	8.0			1,200	700		3.0	1,570	3.20
8/14/63		6.6	19	5.4	0	1,120	11			1,770	980		1.0	1,950	3.90
38 DAVISSON RUN NEAR CLARKSBURG, WEST VIRGINIA															
8/14/63	6.8	.1	.23	.00	102	516	3.8				514	430		1,070	7.7
39 WEST FORK RIVER AT CLARKSBURG, WEST VIRGINIA															
9/30/60			.30	.69	24	142	3.5	0.2	0.9		156	137		366	6.5
4/20/61			.78	.88	22	130	3.0	.1	1.1		139	121		324	6.8
5/9/63					26	199	7.0		1.2		208	187	.0	490	6.6
41 ELK CREEK AT CLARKSBURG, WEST VIRGINIA															
5/9/63					0	792	13		.2		600	600	1.8	1,600	3.45
42 WEST FORK RIVER AT GORE, WEST VIRGINIA															
5/9/63	5.7	.1	.51	1.1	17	386	8.4	.5	.1	607	353	339	.0	817	6.1
43 SIMPSON CREEK AT MEADOWBROOK, WEST VIRGINIA															
5/9/63					0	1,390	30		1.8		792	792	7.6	2,660	2.95
47 TENMILE CREEK AT LUMBERPORT, WEST VIRGINIA															
5/9/63					0	389	6.4		.1		304	304	1.0	905	3.55
48 WEST FORK RIVER AT ENTERPRISE, WEST VIRGINIA															
9/30/60	12	3.7	5.1	2.9	0	562	9.5	.8	.5	824	425	425	1.4	1,200	3.35
4/20/61	9.0	3.1	11	1.6	0	362	3.0	.5	.5	532	301	301	.7	736	4.05
5/9/63					0	690	10		.3		482	482	2.1	1,440	3.30
7/12/63	20	16		6.3	0	1,060	11	.9	1.1	1,670	774	774	4.4	2,300	3.05

Chemical analyses of surface waters of the West Fork River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
				49 BINGAMON CREEK NEAR ENTERPRISE, WEST VIRGINIA											
5/9/63					0	530	8.0		0.2		282	282	0.6	1,080	4.20
				50 BOOTHS CREEK NEAR MONONGAH, WEST VIRGINIA											
5/9/63					2	221	5.6		.2		210	209	.3	497	4.8

Chemical analyses of surface waters of the upper Monongahela River and its tributaries
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
51 BUFFALO CREEK AT BARRACKVILLE, WEST VIRGINIA															
5/9/63					72	133	18		0.5		123	64	0.0	458	7.2
52 MONONGAHELA RIVER AT LOCK 15, AT HOULT, WEST VIRGINIA															
9/30/60		0.4	0.23	0.67	2	78	2.0	0.2	.8		67	67	.1	207	5.1
4/20/61		.6	1.3	.77	2	64	.0	.2	.7		55	54	.1	166	4.8
5/9/63	6.8	2.8	.90	1.4	0	296	8.0	.4	.4	458	217	217	.4	661	4.5
53 PAW PAW CREEK NEAR RIVESVILLE, WEST VIRGINIA															
5/8/63					127	639	78		.4		380	276	.0	1,630	6.6
55 DECKERS CREEK AT MORGANTOWN, WEST VIRGINIA															
5/8/63					0	165	6.0		.2		137	137	.6	402	4.30
56 MONONGAHELA RIVER AT STAR CITY, WEST VIRGINIA															
5/8/63					0	248	8.0		.4		174	174	.6	566	4.00
57 SCOTTS RUN AT BERTHA HILL, WEST VIRGINIA															
5/8/63		75		.81	0	1,720	13		.3		678	678	16	3,080	2.75
58 MONONGAHELA RIVER AT LOCK AND DAM 8, AT POINT MARION, PENNSYLVANIA															
3/27/56	6.6	2.9	.06	.00	0	131	2.5	.1	.1	191	90	90	.5	379	3.70
6/28/56	10	.9	.03	.23	0	97	2.0	.1	1.7	167	74	74	.2	261	4.30
7/12/63	9.2	5.7			0	317	8.0	.3	.2	470	217	217	1.4	787	3.55

Chemical analyses of surface waters of the Cheat River basin
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
60 DRY FORK NEAR DRY FORK, WEST VIRGINIA															
7/10/63	4.0				66	5.2	1.0		0.7	69	56	2	0.0	121	7.7
61 RED CREEK NEAR DRY FORK, WEST VIRGINIA															
7/10/63	3.1				14	6.0	1.0		.3	29	15	4	.0	38	7.0
62 LAUREL FORK NEAR WYMER, WEST VIRGINIA															
7/10/63	3.6				29	5.6	.5		.4	40	24	0	.0	56	7.3
63 GLADY FORK AT EVENWOOD, WEST VIRGINIA															
7/10/63	3.1				18	6.0	.5		.6	28	15	0	.0	38	7.0
65 BLACKWATER RIVER NEAR CORTLAND, WEST VIRGINIA															
5/10/63					38	3.6	2.4		.8		34	3	.0	71	7.1
7/10/63	3.9				51	4.4	1.0		1.6	66	45	3	.0	95	7.2
70 BLACK FORK RIVER AT PARSONS, WEST VIRGINIA															
9/29/60			0.56	0.21	9	33	1.0	0.1	.2		39	32		99	6.4
4/20/61			.22	.02	7	16	1.0	.0	1.2		25	20		52	6.3
5/10/63					15	18	1.6		.1		26	14	.0	71	6.6
7/10/63	4.9				3	38	1.0	.0	.2	72	41	38	.2	120	4.9
74 SHAVERS FORK AT BOWDEN, WEST VIRGINIA															
7/10/63	2.9				13	6.4	1.0		.4	23	14	4	.0	35	7.1
75 SHAVERS FORK AT PARSONS, WEST VIRGINIA															
9/29/60			.34	.04	14	5.8	1.0	.1	.2		14	2		38	6.8
4/20/61			.10	.12	7	8.6	1.0	.0	1.7		14	8		30	6.6
5/10/63					14	8.8	2.0		.2		14	2	.0	38	6.6
7/10/63	3.4				20	7.2	1.5	.1	.2	32	18	1	.0	51	6.5
77 HORSESHOE RUN NEAR ST. GEORGE, WEST VIRGINIA															
7/11/63	5.5				13	4.4	2.0		.8	29	14	4	.0	42	6.9

Chemical analyses of surface waters of the Cheat River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
78 BUFFALO CREEK NEAR ROWLESBURG, WEST VIRGINIA															
5/10/63					12	11	1.0		0.1		12	2	0.0	38	6.6
79 CHEAT RIVER AT ROWLESBURG, WEST VIRGINIA															
9/29/60	3.3		0.23	0.09	11	18	2.0	0.2	.3	41	26	18		75	6.6
5/11/61	3.2		.19	.07	10	9.8	1.5	.1	.9	35	18	10		44	6.7
5/10/63	1.3	0.1	.14	.00	15	12	1.6	.2	.0	36	20	8		62	7.1
7/11/63	4.8				7	30	3.0	.0	.4	63	34	28	.0	91	6.2
80 SALTLICK CREEK AT ROWLESBURG, WEST VIRGINIA															
7/11/63	5.1		.16	.13	33	16	10		.2	76	45	18	.0	125	7.1
81 MUDDY CREEK NEAR RUTHBELLE, WEST VIRGINIA															
7/10/63					0	91	6.0		.0		62	62	.6	222	4.00
5/11/63	9.4		4.5	2.4	0	224	6.5		.1	337	134	134	1.8	549	3.35
82 LITTLE SANDY CREEK NEAR BRANDONVILLE, WEST VIRGINIA															
7/11/63	5.3				5	52	2.0	.0	.5	98	56	52	.0	142	6.0
83 BEAVER CREEK NEAR BRANDONVILLE, WEST VIRGINIA															
7/11/63	6.4	3.3	.95	2.2	0	115	2.0	.1	.1	181	100	100	.8	300	4.10
84 BIG SANDY CREEK AT ROCKVILLE, WEST VIRGINIA															
9/13/60					7	25	2.5	.2	1.0		31	26		86	6.0
9/27/60			.24	.07	9	30	2.0	.1	.2		37	30		99	6.4
5/12/61			.27	.31	6	20	1.5	.1	.6		25	20		61	6.6
5/10/63	3.6	.0	.17	.00	8	16	1.0	.2	.1	38	21	14		58	6.4
7/11/63	4.7				6	39	2.5	.1	.5	70	45	40	.0	118	6.8
85 CHEAT RIVER NEAR PISGAH, WEST VIRGINIA															
6/25/52	3.7		.02		10	14	.8	.0	1.2	40	22	15		57	6.4
87 CANYON CREEK NEAR CANYON, WEST VIRGINIA															
4/23/56	58	135	1,052	18	0	4,492	4.5	6.0	5.6	6,860	852	852	69	5,060	2.30
10/26/56		238	1,380	24	0	5,890	8.0		10	8,370	1,210	1,210	87	5,760	2.30

Chemical analyses of surface waters of the Cheat River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
88 CHEAT RIVER AT POINT MARION, PENNSYLVANIA															
3/56					0	19	0.5	0.1	0.1					125	
6/28/56					0	273	1.8		.1		38	38	0.6	218	3.80
7/12/63	4.2	0.7	0.04		0	38	2.0	.0	.2	59	32	32	.2	122	4.6

Chemical analyses of surface waters of the lower Monongahela River and its tributaries
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
89 DUNKARD CREEK AT MOUNT MORRIS, PENNSYLVANIA															
5/8/63					13	127	20		0.2		90	80	0.0	417	7.4
90 DUNKARD CREEK NEAR DUNKARD, PENNSYLVANIA															
3/27/56					0	130	8.5		.8		108	108	.9	357	3.90
6/28/56					25	64	6.5		.7		80	60		215	6.8
91 DUNKARD CREEK AT SHANNOPIN, PENNSYLVANIA															
8/15/44	11	5.3	0.24	4.2	0	570	45	0.7	.1	901	478	478	1.3	1,300	3.40
4/17/45	4.3				32	49	11	.1	.8	117	67	41		200	6.6
92 GEORGES CREEK AT NEW GENEVA, PENNSYLVANIA															
6/28/56					0	529	10		.0		280	280	5.1	1,370	2.85
93 MONONGAHELA RIVER AT GREENSBORO, PENNSYLVANIA															
8/15/44	3.9	5.8	.13	1.2	0	214	10	.2	1.3	336	199	199	1.5	650	3.30
4/17/45	6.0	4.0	.11	.5	0	123	1.6	.2	1.0	176	118	118	1.1	397	3.35
94 WHITELEY CREEK NEAR MAPLETOWN, PENNSYLVANIA															
6/28/56					0	388	4.0		.0		310	310	2.3	916	3.50
95 MUDDY RUN AT CARMICHAELS, PENNSYLVANIA															
6/28/56					146	162	52		1.0		140	20		755	8.1
96 SOUTH FORK TENMILE CREEK NEAR ROGERSVILLE, PENNSYLVANIA															
4/13/60					77	31	1.5		2.5	150	77	14		182	7.5
10/19/60					126	24	5.5		.4		126	20		262	8.5
7/12/62					108	23	7.3		3.2		106	18		247	8.1

Chemical analyses of surface waters of the lower Monongahela River and its tributaries--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
97 SOUTH FORK TENMILE CREEK AT JEFFERSON, PENNSYLVANIA															
8/15/44	3.4				130	72	43	0.1	1.6	294	144	37		495	7.3
4/16/45	2.8				84	32	8.2	.1	.8	134	92	23		231	7.6
98 TENMILE CREEK NEAR MILLSBORO, PENNSYLVANIA															
3/27/56	8.2				88	60	6.0	.1	3.3	200	117	45		300	7.9
6/28/56					96	72	16		1.6		118	39		365	8.2
99 LICK RUN AT HOPWOOD, PENNSYLVANIA															
4/13/60					17	20	3.0		1.6	74	30	16		88	6.6
10/19/60					47	24	35		.7		68	30		248	7.7
7/11/62					45	27	40		.7		76	39		275	7.2
100 DUNLAP CREEK AT ALLISON, PENNSYLVANIA															
8/17/44	2.5				246	1,680	152	.6	9.8	2,930	1,030	829		3,640	7.0
4/16/45	6.0				170	1,350	75	.8	5.5	2.340	913	773		2,860	6.9
101 DUNLAP CREEK AT BROWNSVILLE, PENNSYLVANIA															
3/28/56					354	703	55		4.3		460	170		1,850	7.8
6/28/56					177	531	50		2.7		295	150		1,600	8.1
102 MONONGAHELA RIVER AT BROWNSVILLE, PENNSYLVANIA															
3/28/56					0	103	2.5		.2		76	76	1.3	295	3.90
6/29/56					0	92	3.0		.4		80	80	.4	248	4.10
12/5/56					0	142	7.4		2.2		100	100	.3	402	3.90
103 REDSTONE CREEK AT WALTERSBURG, PENNSYLVANIA															
8/17/44	27	13	127	10	0	1,830	20		.8	2,500	1,640	1,640	17	3,650	2.40
4/16/45	26	67	174	9.0	0	1,850	11	1.1	.8	2,540	1,780		21	3,320	2.50
6/28/56					0	538	11		.3		410	410	3.1	1,340	3.00
104 REDSTONE CREEK AT BROWNSVILLE, PENNSYLVANIA															
3/28/56	21	3.4	1.5	.01	0	625	8.0	.4	.3	920	334	334	3.8	1,410	3.10
6/28/56					0	735	22		.1		490	490	3.5	1,540	3.25

Chemical analyses of surface waters of the lower Monongahela River and its tributaries--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
105 PIKE RUN AT COAL CENTER, PENNSYLVANIA															
3/28/56					124	674	20		3.8		525	423		1,560	7.6
106 MONONGAHELA RIVER AT CHARLEROI, PENNSYLVANIA															
4/21/59					2	104	1.5		1.6	194	94	93		266	5.0
107 PIGEON CREEK AT MONONGAHELA, PENNSYLVANIA															
9/6/51					22	1,180	113		1.8		480	455		3,070	7.7
3/28/56					154	372	26		4.9		300	174		946	7.5
6/29/56					168	269	26		2.9		280	142		890	7.2
108 MONONGAHELA RIVER AT COURTNEY, PENNSYLVANIA															
12/4/56					0	180	8.6		2.8		115	115	0.5	489	3.80
109 PETERS CREEK AT CLAIRTON, PENNSYLVANIA															
9/6/51					0	1,050	53		16		625	625	1.7	2,360	3.60
4/21/52	9.6				32	479	34	0.1	7.6	807	421	396		1,060	6.6
3/28/56					3	522	14		5.5		430	428		971	5.1
6/29/56					28	582	19		3.8		460	437		1,160	6.2
110 MONONGAHELA RIVER AT DRAVOSBURG, PENNSYLVANIA															
3/29/56					0	106	4.0		2.1		85	85	.3	283	4.40
6/29/56					1	122	5.5		1.6		100	99		315	4.6

Chemical analyses of surface waters of the Youghiogheny River basin
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
114 YOUGHIOGHENY RIVER AT YOUGHIOGHENY RIVER DAM, PENNSYLVANIA															
8/10/50	3.2		0.05		5	16	1.2	0.1	1.6	35	19	15		51	5.7
3/27/56	5.2				6	13	1.0	.1	3.1	46	18	13		55	6.6
6/30,56					6	10	1.5		1.5		18	13		48	6.3
4/20/59	3.8		.08	0.00	8	12	2.8	.2	3.6	50	18	12		51	5.6
10/21/59	3.6	0.1	.01	.00	8	18	2.0	.2	1.0	38	22	16		61	6.3
116 TUB MILL RUN AT WEST SALISBURG, PENNSYLVANIA															
8/11/50	3.9		.21		17	24	1.8	.1	2.1	63	38	24		94	6.9
117 CASSELMAN RIVER NEAR SALISBURY, PENNSYLVANIA															
8/9/50	3.3		.06		14	44	2.2	.1	1.8	86	55	44		137	6.5
118 BIG PINEY RUN NEAR SALISBURY, PENNSYLVANIA															
8/9/50	3.9		.16		24	11	2.0	.1	1.4	49	31	11		73	6.8
119 FLAUGHERTY CREEK AT MEYERSDALE, PENNSYLVANIA															
8/11/50	4.2		.10		15	42	2.5	.2	2.5	94	57	44		147	6.7
120 ELKLICK CREEK AT SUMMIT MILLS, PENNSYLVANIA															
4/14/60					7	23	1.0		4.1	65	24	19		74	6.3
7/10/62					14	43	1.6		1.2		58	47		140	6.6
121 BLUE LICK CREEK NEAR MEYERSDALE, PENNSYLVANIA															
8/11/50					0	264	3.0		.3		33	33	1.0	665	3.50
122 BUFFALO CREEK AT GARRETT, PENNSYLVANIA															
8/9/50	8.1	1.4	.12	1.0	0	242	6.0	.2	3.9	368	258	258	1.2	582	3.75
123 EAST BRANCH COXES CREEK NEAR EDGEWOOD, PENNSYLVANIA															
8/11/50	6.1		.01		34	68	7.4	.3	6.8	163	95	67		256	6.7
124 WEST BRANCH COXES CREEK NEAR EDGEWOOD, PENNSYLVANIA															
8/11/50	2.6		.12		51	13	4.1	.1	2.4	79				130	7.8

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
125 COXES CREEK NEAR ROCKWOOD, PENNSYLVANIA															
8/10/50	2.1		0.03		10	112	28	0.1	5.2	233	123	115		376	6.2
4/14/60					9	48	8.8		7.5	156	61	54		167	6.2
7/11/62					55	71	24		14		122	77		352	7.0
126 MIDDLE CREEK NEAR CASSELMAN, PENNSYLVANIA															
8/11/50	3.3		.08		41	10	2.2	.1	1.9	62	43	10		102	7.7
127 CASSELMAN RIVER AT MARKLETON, PENNSYLVANIA															
8/16/44	8.6	9.7	.15	4.2	0	372	4.9	.2	1.0	557	372	372	2.0	827	3.40
4/18/45	4.6	.6	.04	.2	0	42	1.0	.1	1.5	68	42	42	.3	123	4.35
4/19/56					1	52	1.5		2.3		53	52		149	4.6
5/15/56					0	65	2.5		1.2		66	66	.6	175	4.40
6/18/56					0	137	2.4		.2		106	106	.8	362	3.80
7/30/56					0	74	4.5		.3		80	80	.3	220	4.40
9/4/56					0	132	2.2		1.0		105	105		304	4.00
4/20/59					0	69	2.0		.2	116	61	61	.3	201	3.80
3/16/63					0	43	3.0	.1	1.0	80	42	42	.1	148	4.45
128 ISERS RUN AT MARKLETON, PENNSYLVANIA															
8/11/50					1	10	2.0		1.0		10	9		50	4.5
129 MCCLINTOCK RUN AT FORT HILL SCHOOL, PENNSYLVANIA															
8/11/50	4.4		.09		14	9.6	1.0	.1	1.4	35	20	9		50	6.8
130 CASSELMAN RIVER AT HARNEDSVILLE, PENNSYLVANIA															
8/11/50	4.8	1.2	.08	4.0	0	112	2.6	.1	1.5	182	119	119	1.1	310	4.20
2/9/56					0	33	2.0		2.7		34	34	.2	126	4.5
3/27/56	6.1	.1			0	48	25	.1	3.0	216	55	55	.6	147	4.40
6/30/56	6.9				2	63	1.5	.1	1.3	110	56	54		177	4.6
131 WHITES CREEK NEAR HARNEDSVILLE, PENNSYLVANIA															
8/11/50	4.8		.10		9	27	1.2	.1	1.9	60	34	27		89	7.0

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
					132 LAUREL HILL CREEK NEAR BAKERSVILLE, PENNSYLVANIA										
8/11/50	3.9		0.08		26	5.1	1.8	0.2	2.3	42	28	7		68	7.3
					133 LAUREL HILL CREEK AT URSINA, PENNSYLVANIA										
8/16/44	.9				22	11	1.2	.1	.4	39	29	11		69	7.1
4/18/45	4.0		.10		8	9.2	1.0	.1	1.1	28	18	11		39	6.6
8/10/50	2.8		.15		12	8.7	1.5	.1	1.2	32	19	9		47	6.5
2/9/56					4	12	1.0		3.7		20	17		68	6.1
3/27/56	4.8		.04		8	12	6.0	.1	2.3	49	16	10		51	6.8
6/30/56					10	9.0	2.5		1.2		18	10		50	6.9
					134 CASSELMAN RIVER AT CONFLUENCE, PENNSYLVANIA										
10/21/59	6.3	1.5	.02	1.2	0	150	4.0	.3	.5	224	138	138	0.4	341	4.25
					136 DRAKE RUN NEAR CONFLUENCE, PENNSYLVANIA										
4/13/60					3	11	1.2		.7		11	9		32	6.0
10/19/60					5	6.3	1.0		.3		10	6		28	6.2
7/11/62					4	8.0	.8		.3		11	8		29	5.8
					137 YOUGHIOGHENY RIVER AT OHIOPYLE, PENNSYLVANIA										
2/9/56					2	23	2.1		3.5		28	26		96	5.0
3/27/56					1	41	2.0		2.6		41	40		123	4.8
					138 BIG MEADOW RUN AT OHIOPYLE, PENNSYLVANIA										
8/10/50	3.5		.11		19	7.4	1.4	.1	.9	36	23	8		54	7.0
3/27/56					7	17	1.2		1.7		22	16		51	6.2
					139 INDIAN CREEK AT CHAMPION, PENNSYLVANIA										
8/11/50	3.9		.08		28	12	1.2	.1	2.4	53	38	15		84	7.7
6/27/56					20	13	2.5		2.0		30	14		80	6.7
					140 CHAMPION CREEK AT MELCROFT, PENNSYLVANIA										
6/27/56					2	52	4.5		3.1		56	54		156	5.0

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
141 INDIAN CREEK NEAR MELCROFT, PENNSYLVANIA															
4/14/60					14	15	2.0		2.8	56	24	13		63	6.4
7/10/62					28	9.9	6.6		2.5		37	14		95	7.1
142 BACK CREEK AT INDIAN HEAD, PENNSYLVANIA															
6/27/56					18	14	1.5		2.0		30	15		73	6.8
143 POPLAR RUN NEAR NORMALVILLE, PENNSYLVANIA															
6/27/56					2	35	1.5		1.0		40	38		104	5.1
144 INDIAN CREEK AT WHITE BRIDGE, PENNSYLVANIA															
3/27/56	5.3		0.01		10	21	2.5	0.1	2.0	75	30	22		81	6.8
6/27/56	6.3		.05		11	25	1.0	.1	2.7	80	37	28		92	6.3
145 INDIAN CREEK NEAR MILL RUN, PENNSYLVANIA															
8/9/50	4.2				12	30	1.6	.1	2.5	64	41	31		102	6.3
146 RASLER RUN NEAR NORMALVILLE, PENNSYLVANIA															
6/27/56					0	69	1.6		.0		60	60	0.7	196	4.20
147 DUNBAR CREEK NEAR CONNELLSVILLE, PENNSYLVANIA															
8/9/50	7.3		.02		28	72	4.0	.1	7.9	157	97	74		240	6.9
3/26/56	6.5		.02		7	32	1.5	.1	4.1	72	37	32		105	6.6
6/30/56					18	42	3.5		3.0		56	41		140	6.6

. Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
148 YOUGHIOGHENY RIVER AT CONNELLSVILLE, PENNSYLVANIA															
8/17/44	2.9				4	43	2.5	0.1	1.8	77	46	43		127	5.5
4/20/45	3.8			0.1	3	26	1.5	.1	1.0	49	30	27		77	5.4
2/9/56					2	28	2.4		4.1		36	34		90	5.2
3/27/56	6.1				5	30	.5	.1	3.4	75	30	26		95	5.2
6/28/56					6	29	2.5		1.5		38	33		91	6.2
12/5/56					4	29	2.3		1.5		30	27		90	6.4
11/17/61	4.6				8	34	4.0	.1	3.8	70	43	37		109	6.1
1/19/62	5.0			.05	6	26	3.0	.1	2.6	69	31	26		87	6.4
2/28/62	4.8	0.0		.03	4	24	1.5	.1	2.9	65	29	26		83	5.7
3/28/62	6.0			.17	3	26	3.0	.0	2.2	75	27	25		84	5.6
6/14/62	5.7			.24	4	51	3.0	.0	1.3	107	58	54		144	5.8
8/22/62					6	28	3.0		2.1		35	30		102	6.3
9/26/62	4.4			.01	9	31	1.5		.6	86	38	30		110	6.6
11/1/62	5.7				8	37	5.0	.0	3.1	80	46	39		136	6.5
12/5/62	5.0				5	27	3.0	.0	2.4	65	30	26		101	5.9
1/9/63	4.8				6	26	5.0	.2	2.3	74	32	27		105	6.3
2/13/63					4	33	9.0		1.4		41			146	6.4
4/24/63	4.3				3	39	2.5		.7	84	42	39		121	6.3
5/28/63	3.7			.17	6	34	3.0	.2	2.0	60	39	34		110	5.6
149 MOUNTS CREEK NEAR CONNELLSVILLE, PENNSYLVANIA															
8/11/50	3.9				49	25	4.5	.2	2.1	93	66	25		159	7.7
3/26/56					24	48	2.5		4.3		68	48		163	6.6
6/30/56					42	44	4.0		2.4		82	48		187	7.3
150 YOUGHIOGHENY RIVER NEAR DAWSON, PENNSYLVANIA															
3/26/56					3	36	2.0		3.0		46	44		111	5.3
152 JACOBS CREEK AT JACOBS CREEK, PENNSYLVANIA															
8/9/50	9.5				3	174	8.0	.1	7.1	300	178	176		423	5.3
3/26/56	8.3				2	92	2.5	.1	4.1	146	88	86		237	5.7
6/30/56					8	98	5.0		4.1		110	103		282	6.0

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
153 SEWICKLEY CREEK NEAR YOUNGWOOD, PENNSYLVANIA															
8/11/50	20	24	4.6	6.0	0	1,210	9.0	0.1	0.5	1,780	1,070	1,070	6.0	2,590	2.85
154 JACKS RUN AT YOUNGWOOD, PENNSYLVANIA															
8/11/50	18	219	112	10	0	2,600	77	.1	.3	4,180	2,730	2,730	32	3,750	3.70
155 LITTLE SEWICKLEY CREEK NEAR HERMINIE, PENNSYLVANIA															
8/11/50	5.8				101	237	8.9	.3	2.5	465	312	230		668	7.6
156 SEWICKLEY CREEK NEAR SUTERSVILLE, PENNSYLVANIA															
8/9/50	20	11	9.1	5.0	0	1,500	31	.1	.7	2,380	1,040	1,040	13	3,080	2.70
2/9/56					2	278	8.0		9.6		236	234		634	4.7
3/26/56	18	3.4	.13		0	461	6.5	.3	2.1	692	333	333	1.7	994	3.70
6/30/56					0	999	21		.9		605	605	3.3	2,360	3.20

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

157 YOUGHIOGHENY RIVER AT SUTERSVILLE, PENNSYLVANIA

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
8/18/44	7.0	5.0	0.16	1.2	0	293	16	0.3	0.3	462	269	269	1.1	777	3.20
4/21/45	6.0	2.6	.06	.4	0	138	2.6	.1	1.6	199	120	120	.7	398	3.50
8/11/50	3.9	.5		.5	0	91	1.9	.1	1.4	138	68	68	.3	225	4.6
2/9/56ab					4	43	2.3		4.6		46	43		134	5.6
2/9/56bc					2	108	4.5		6.0		102	100		288	5.6
3/26/56					4	60	2.5		3.7		64	61		175	5.8
5/16/56					0	253	5.0		.5		166	166	1.3	664	3.50
5/18/56					5	51	2.0		2.2		52	48		152	6.5
6/30/56					1	71	2.5		1.4		55	54		201	4.7
9/12/56					5	88	2.5		2.1		72	31		230	6.1
10/27/58a					0	86	4.0		1.4		62	62	.2	226	4.5
10/27/58b					0	206	7.0		.7		120	120	.5	553	3.65
10/27/58c					0	388	12		1.1		215	215	1.0	941	3.35
11/21/58					0	103	4.0		1.0		74	74	.1	259	4.35
12/21/58					0	359	6.0		.4		200	200	.4	904	3.35
1/14/59a					0	91	4.0		1.3		72	72	.2	253	4.20
1/14/59c					0	321							.6	785	3.50
2/6/59a					2	68	3.5		3.8	153	62	61		178	5.2
2/6/59c					17	155	5.5		5.3		135	121		394	6.5
4/13/59	5.2				10	42	5.0	.2	2.7	100	50	42		131	6.1
5/22/59					3	84	3.5		3.4	152	73	71		199	5.2
7/28/59					0	128	5.0		2.3	209	86	86	.2	323	4.30
9/4/59					0	150	4.0		1.0	236	86	86	.4	340	3.80
10/3/59					0	103	4.5		1.5	173	78	78	.1	247	4.40
11/12/59a					4	58	2.0		3.6	104	53	50		158	5.5
11/12/59c					0	313	10		3.2		175	175	.5	733	3.65
6/10/60bc					2	84	2.5		2.5		80	80		216	5.1
7/15/60					10	84	4.5		2.5	161	74	66		224	6.4
9/23/60					4	79	4.8		2.7	135	74	71		210	5.7
3/17/61a					3	32	2.0		4.0		35	33		104	5.4
3/17/61c					2	106	4.0		3.9		100	99		277	5.0
4/24/61					5	44	2.0		3.9		48	44		135	5.8

a Left side
b Center
c Right side

Chemical analyses of surface waters of the Youghiogheny River basin--Continued
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
157 YOUGHIOGHENY RIVER AT SUTERSVILLE, PENNSYLVANIA--Continued															
5/26/61ab					1	69	1.5		2.2		62	61	0.3	192	4.8
5/26/61c					0	352	6.0		3.5		250	250	1.0	830	3.80
6/30/61ab					0	122	3.5		.8	202	96	96	.2	324	4.40
6/30/61c					0	588	12		.7		365	365	2.5	1,350	3.25
8/3/61	4.7				4	65	3.0	0.2	1.6	113	58	55		172	6.0
9/7/61ab					4	65	2.5		1.7		54	51		173	5.8
9/7/61c					0	200	8.0		.7		122	122	.5	547	3.60
159 YOUGHIOGHENY RIVER AT VERSAILLES, PENNSYLVANIA															
3/26/56					0	104	4.0		3.6		96	96	.6	276	4.5
160 YOUGHIOGHENY RIVER AT MCKEESPORT, PENNSYLVANIA															
8/9/50	8.2	0.6	0.07	1.0	0	170	7.4	.1	.6	277	144	144	.9	455	4.00
3/26/56	8.0		.03		4	105	3.5	.1	3.7	181	93	90		277	6.1
6/29/56	7.1	.6	.01	.40	3	110	4.5	.1	2.2	214	85	83		312	4.7

a Left side
b Center
c Right side

Chemical analyses of surface waters of lower Monongahela River and its tributaries
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$ Ca,Mg	Hardness as $CaCO_3$ NCH	Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
161 ABERS CREEK NEAR MURRYSVILLE, PENNSYLVANIA															
9/6/51	2.2				108	76	8.0	0.1	1.5	245	174	77		398	8.2
4/21/52					53	77	3.5		1.6		124	81		293	7.3
162 TURTLE CREEK AT TRAFFORD, PENNSYLVANIA															
9/9/44	27	19	11	3.6	0	526	38		1.9	840	510	510	3.9	1,150	3.40
4/2/45	20	21	7.5	2.2	0	528	7.5	.2	1.7	723	529	529	5.3	1,320	2.80
9/6/51					0	681	23		.4		510	510	3.7	1,340	4.00
4/21/52	10	13	1.3	2.0	0	339	22	.1	1.2	565	269	269	2.5	861	3.30
163 TURTLE CREEK AT TURTLE CREEK, PENNSYLVANIA															
3/26/56					2	227	9.0		5.6		220	218		512	4.6
6/29/56					0	1,150	21		2.1		510	510	9.1	2,380	2.90
7/17/57					0	1,080	80		2.2	1,480	510	510	4.4	2,420	2.90

Chemical analyses of surface waters of lower Monongahela River and its tributaries
(Constituents in parts per million)

Date	SiO_2	Al	Fe	Mn	HCO_3	SO_4	Cl	F	NO_3	Dissolved solids (residue on evaporation at 180°C)	Hardness as $CaCO_3$		Total mineral acidity H+	Specific conductance (micromhos at 25°C)	pH
											Ca,Mg	NCH			
164 MONONGAHELA RIVER AT BRADDOCK, PENNSYLVANIA															
9/9/44	12	5.0	0.04	2.6	0	451	25	0.4	0.8	704	336	336	1.1	994	3.70
4/2/45	6.8	4.1	.08	.9	0	185	4.5	.8	1.4	263	160	160	.8	447	3.70
10/13/58	9.2				3	213	15	.3	2.3	346	165	162		517	6.5
11/10/58					0	282	9.6		2.2		185	185	.7	624	4.00
1/20/59	11	.4			52	134	27	.2	6.1	332	162	119		471	6.5
2/17/59					5	95	4.0		3.7	179	90	86		232	5.8
8/15/59	11	.9			0	301	14	.2	4.7	466	221	221	.3	694	4.30
10/22/59	9.0	1.8		1.4	0	283	14	.4	.7	432	181	181	.6	683	4.00
10/28/59					0	223	9.0		1.4	366	140	140	.7	529	4.00
12/7/59	6.0			.55	4	95	7.0	.1	3.2	164	85	81		253	5.6
2/8/60	8.3			.81	10	136	11	.2	6.2	230	130	123		368	6.3
4/18/60	7.2	.2		.55	1	121	5.0	.1	2.0	196	100	99		300	5.1
9/12/60					34	218	14		3.9	390	186	158		559	7.1
10/10/60	8.5	1.0		1.1	0	211	8.5	.2	3.2		150	150	.2	472	4.40
4/3/61	7.1				14	109	5.0		2.3	190	108	97		297	6.4
6/22/61	7.9			.45	5	108	4.5	.2	1.4	215	91	87		286	5.9
7/17/61	8.6	.2			2	167	8.0	.1	.5	273	133	131		402	5.2
10/2/61	8.1	1.5		.82	4	230	10		1.0	379	157	154		502	4.6
11/1/61	7.8	1.7		.88	0	198	9.0	.4	3.5	328	145	145	.6	483	4.00
2/20/62	10			.24	8	107	7.5	.1	4.2	201	101	94		297	6.1
4/2/62	6.0			.22	9	95	5.0	.1	4.4	175	94	86		258	6.2
4/23/62					11	135	7.5		6.6		122	113		332	6.3
6/18/62	9.0	1.7		.83	0	192	6.5	.2	2.8	298	131	131	.6	446	4.05
7/9/62					3	202	4.0		1.7		146	144		456	5.5
8/6/62	8.7	2.0		.38	0	250	11	.1	1.2	388	164	164		566	4.5
9/14/62	11	1.7		1.6	0	336	18	.2	4.0	554	258	258		814	4.35
11/26/62					6	75	7.5		4.1		71	66		232	6.0
165 MONONGAHELA RIVER AT HAYS STATION, PENNSYLVANIA															
9/18-23/50	6.7		.05		9	129	10	.2	1.2	218	106	99		318	6.1
9/24-29/50	6.6		.05		26	86	8.0	.3	1.2	180	92	71		270	6.8

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, Mr. Shaw?

MR. SHAW: I believe that that completes our presentation.

MR. STEIN: Thank you very much, Mr. Shaw.

At this point we would like to call upon the representatives of Maryland.

First, Mr. Robert Brown. Mr. Brown?

STATEMENT OF ROBERT M. BROWN, CONFEREE AND CHIEF, BUREAU OF ENVIRONMENTAL HYGIENE, STATE DEPARTMENT OF HEALTH, STATE OF MARYLAND

MR. BROWN: May I speak from here, Mr. Chairman?

MR. STEIN: Certainly.

MR. BROWN: I am Robert M. Brown, Chief of the Bureau of Environmental Hygiene of the Maryland State Department of Health.

Maryland has two agencies concerned with water quality control. The State Health Department is one. The other is the State Water Pollution Control Commission, which is represented here today by Mr. Paul W. McKee, who is at my right.

I would say in a general way, and speaking for Maryland, that this is the second such conference in which we have participated. The first was that involving abatement of pollution of the interstate waters of the Potomac River in the Washington-Maryland area. Its results were entirely constructive and productive, and we welcomed the opportunity to be a party to that conference.

We endorse and support the purposes of this conference here today. We believe that nothing but good can come from an opportunity where, with the spotlight upon us, we can relate that which has been done to maintain water quality and abate the pollution of our water resources.

Maryland has but a very small share in the watershed under consideration today. We are in the fringes of the Youghiogheny watershed, which is a tributary to the Monongahela. The area of our State involved is one that is predominantly rural in economy, with activity devoted to farming and to recreation.

In years past, strip mining and some open mining was an important part of the economy, but it is no longer so.

We have relatively few problems involving municipalities. We have one situation involving three communities in the vicinity of Oakland, the county seat, where progress is being made in the development of sewage services for Oakland, Mountain Lake Park, and Loch Lynn.

Two other communities on another tributary, Friendsville and Grantsville, are under study, under work with our department, to see that the sewage facilities have a completely adequate nature for populations of 500 and 450.

The activities of our two agencies have been pooled in developing comprehensive studies of water quality all over the State, but with a substantial focus in this part of our State and in this watershed now under consideration.

I would like to ask Mr. McKee if he will relate to you the work which we have been doing in this area.

Thank you, Mr. Stein.

STATEMENT OF PAUL W. McKEE, DIRECTOR, MARYLAND STATE WATER AND POLLUTION CONTROL COMMISSION

MR. MC KEE: Mr. Chairman, my name is Paul W. McKee. I am Director of the Maryland Water Pollution Control Commission.

I too would like to support the conference technique as exemplified here today. I believe such conferences can only produce overwhelming evidence of the effort and the progress that is being made in all of the States in the Monongahela Basin.

As Mr. Brown told you, the Maryland portion of the Monongahela is quite small, limited to the upper reaches of the Youghiogheny River and the headwaters of the Casselman.

The Water Pollution Control Commission in Maryland has had the Youghiogheny River study under way now for three years. We have continuous data on this particular watershed, and have had a rather comprehensive water quality study made.

We are undertaking, with the cooperation of other State agencies, a further study of this watershed, a biological study of this watershed.

There are small localized areas of the Youghiogheny River that are affected by two basic types of discharges, sanitary sewage and acid mine drainage. The acid mine drainage problem would fall under my jurisdiction.

For several years, there have been conferences with representatives of West Virginia, Maryland, and political representatives of both States in Maryland and in West Virginia, to develop a program to seal the acid mine discharges that are occurring in the watershed in the vicinity of the West Virginia-Maryland line. These conferences have reached the point now that the State of West Virginia has appropriated funds, and the State of Maryland has appropriated funds and allocated them to their respective mine agencies, and a sealing program is currently under way and will produce, I hope, some excellent results in alleviating the acid mine discharges in the upper reaches of the Youghiogheny River, particularly Snowy Creek and Laurel Run.

Below this point in the Youghiogheny River, to the town of Friendsville, the water quality is excellent. At the point where the water quality crosses the State line into Pennsylvania, there is little, if any, deterioration of the water quality, other than a possible bacterial contamination from sewage of the area in and around Friendsville.

Casselman River, which is a little farther east and a tributary to the Monongahela eventually, has not been studied by my group as thoroughly and as completely as the Youghiogheny River, but we do have sufficient data on it to show that the quality of the water, as it crosses the State line into Pennsylvania, is basically unaffected by any discharges of waste within the State of Maryland.

The pH of the water, as it crosses the line, is excellent. Unfortunately, we do not have bacterial analysis of this portion of the river, and cannot support the statement made in the study of the bacterial quality of the Casselman below the Maryland State line.

MR. STEIN: Thank you, Mr. McKee and Mr. Brown.

Are there any comments or questions?

(No response.)

MR. STEIN: As I understand your statement, in your opinion -- and I am speaking to both of you now -- there is no significant interstate pollution in the Monongahela River system caused by the Youghiogheny or its tributaries. I am talking about interstate, not intrastate pollution.

MR. BROWN: This is true, Mr. Chairman.

As these waters cross from Maryland into Pennsylvania, we believe that they are of high quality and unaffected by pollution which would have any origin in Maryland.

MR. STEIN: Thank you, Mr. Brown.

Are there any further comments or questions?

(No response.)

MR. STEIN: If not, thank you, gentlemen, for a very complete and concise statement on the part of Maryland, dealing with the Youghiogheny and your portion of the Monongahela River Basin.

At this point, we would like to call on Dr. Wilbar of Pennsylvania for the presentation of Pennsylvania. Dr. Wilbar?

STATEMENT OF DR. C. L. WILBAR, JR., M.D.,
CHAIRMAN, SANITARY WATER BOARD, AND
SECRETARY OF HEALTH, STATE OF PENNSYLVANIA

DR. WILBAR: Mr. Chairman, my fellow conferees, ladies and gentlemen.

Copies of my statement are available. I don't know if there are enough for each one of you to have one, but they are yellow-bound, and I hope there is one for each two persons in the audience to read.

I am Dr. Charles Wilbar. I appear here as Chairman of the Pennsylvania Sanitary Water Board. I am also Secretary of Health of the Commonwealth, and the Chairman of the Interstate Commission on the Potomac River Basin, and past Chairman of ORSANCO.

After I complete my statement, we have six statements from State-wide agencies of Pennsylvania, two industrial agencies, two sportsmen and conservation agencies, and two representing the waterworks association, and a group representing municipalities.

As you heard from the Chairman, there are certain other persons who wish to make statements in behalf of other groups, or individuals. They will have that opportunity tomorrow at the completion of the other reports.

I. INTRODUCTION

Persons attending this conference do not need to have emphasized for them the importance of water for the well-being of humans. Water is essential for domestic use, for industrial use and for recreational use. Each of these uses is essential to the health and to the social and economic needs of our populace. Each water user needs to be aware of further water needs downstream and return waters to the stream after use in as good a condition as is scientifically and economically possible. In Pennsylvania since 1923, when the Sanitary Water Board was first created, and particularly since the passage of the Clean Streams Act in 1937 and its strengthening in 1945, the Sanitary Water Board has been striving assiduously to maintain and improve the cleanliness of the streams of this Commonwealth. We have also been an active and cooperative signatory State in the Ohio River Valley Water Sanitation Commission since its creation about fifteen years ago. We have worked in a frequent and cooperative fashion with the water pollution control staff of the Public Health Service in connection with their studies and with the administration of financial aid to municipalities for building of sewage treatment plants.

As Chairman of the Sanitary Water Board of Pennsylvania, I have been requested by that Board and by Governor William W. Scranton to present to this Conference official facts and opinions of our Commonwealth concerning pollution of the Monongahela River Basin and steps which will be taken and should be taken for abatement of such pollution.

The Secretary of Health, Education, and Welfare, under Section 8 of the Federal Water Pollution Control Act (33-U.S.C. 446 et seq.) has the authority to call a conference such as this whenever, on the basis of reports, surveys or studies, he has reason to believe that there is pollution endangering the health or welfare of persons in a State other than that in which the discharges originate is occurring. While Pennsylvania is the last State in which the Monongahela River flows (before it joins the Allegheny River to form the Ohio River) we have cooperated with both West Virginia and Maryland toward improving conditions in this highly industrialized river basin. It is also clearly evident that some of the pollution which enters the Monongahela River Basin originates in Pennsylvania.

Although the Secretary of Health, Education, and Welfare has authority to call a conference such as this, I am sure that all parties concerned realize that in the Federal

Water Pollution Control Act, not only is it the congressional declaration of policy but in other portions of the act it is also declared that the primary responsibility for preventing and controlling water pollution is to remain in the State and interstate agencies as distinguished from the Secretary of Health, Education, and Welfare or his designee. Included in the declaration of policy of the act are the words " ... it is hereby declared to be the policy of Congress to recognize, preserve, and protect the primary responsibilities and rights of the States in preventing and controlling water pollution, ..." and further that "Nothing in this Act shall be construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the waters (including boundary waters) of such States". It should further be pointed out that the interstate compact on the Ohio River Basin, which was officially sanctioned by the Congress and all of the States involved, has commissioners from the Federal Government as well as from each State, as you heard from Chairman Shaw. Any of the parties involved may bring up before this Commission interstate pollution problems and have frequently done so in the past, but none of the parties from the Federal Government or the States have up to now requested specific action regarding the Monongahela River Basin.

Pennsylvania is willing to tell its story regarding the pollution problems and their solution in the Monongahela Basin and to discuss these problems with representatives from Maryland and from West Virginia as well as with representatives from the Ohio River Valley Water Sanitation Commission and the Federal Government. Besides the State's official presentation the Sanitary Water Board has requested presentations from spokesmen of Pennsylvania's mining industry, manufacturing industry, water works industry, municipalities, and sportsmen's associations. At the request of the Board the Pollution Abatement Committee of the State Chamber of Commerce selected a representative to speak for the mining industry and to speak for the manufacturing industry. The Pennsylvania Section of the American Water Works Association selected the water works industry spokesman. The local government groups (Pennsylvania State Association of Boroughs, League of Cities, Municipal Authorities Association and Township Associations) selected a spokesman to represent the municipalities. The Pennsylvania Federation of Sportsmen's Clubs and the Pennsylvania Division of the Isaak Walton League of America each selected a spokesman. I shall introduce these spokesmen later but at this time the official presentation which I have will:

(1) Tell of Pennsylvania's Water Pollution Control Program.

(2) Indicate water pollution control progress that has been made in the Pennsylvania portion of the Monongahela

River Basin.

(3) Outline our water pollution control plans and needs for the future.

II. DESCRIPTION OF THE MONONGAHELA RIVER BASIN

The Monongahela River originates in northern West Virginia and is formed by the confluence of the Tygart and West Fork Rivers. The river is 128.1 miles in length. It flows through Pennsylvania in a northerly direction for 91.6 miles forming one boundary of the following Pennsylvania counties: Greene, Fayette, Westmoreland, Washington and Allegheny. At Pittsburgh in Allegheny County, it meets the Allegheny River to form the Ohio River.

The basin lies entirely in the Appalachian Plateau Region and is characterized by rugged topography with narrow stream valleys.

The drainage basin comprises a total of 7,340 square miles of which 57 percent is in West Virginia, 38 percent is in Pennsylvania, and 5 percent is in Maryland.

Major tributaries of the Monongahela River and their drainage areas are: The West Fork River - 882 square miles, the Tygart River - 1,369 square miles, the Cheat River - 1,424 square miles, and the Youghiogheny River, 1,768 square miles.

Approximately 71 percent of the Youghiogheny River Basin lies within Pennsylvania. Only approximately 7 percent of the Cheat River drainage basin lies in Pennsylvania.

Stream flow in the basin is regulated to some extent by a network of multiple-purpose dams and reservoirs in the headwaters. The major impoundments include Tygart, Lake Lynn, (Cheat River), Deep Creek (tributary of the Youghiogheny River) and Youghiogheny River Reservoirs.

The U. S. Geological Survey has three gaging stations on the Monongahela River in Pennsylvania, and four gaging stations on the Youghiogheny River in Pennsylvania. The drainage areas and flows at the locations of each of these gaging stations are given in Table 1, Appendix A.

The Monongahela River Basin overlies one of the most valuable and extensively developed deposits of bituminous coal in the world. Coal mining, coking, and iron and steel manufacturing have made this district world famous. The lower Monongahela River passes through one of the most densely developed industrial areas in the Nation.

III. PENNSYLVANIA'S WATER POLLUTION CONTROL PROGRAM

A. Sanitary Water Board

In Pennsylvania, the responsibility for the administration of the State's Water Pollution Control Program rests with the Sanitary Water Board. Pennsylvania's Sanitary Water Board was established in 1923 as an administrative board within the Department of Health.

This Board was the first State agency of its type to have the responsibility for a State's water pollution control activities. It introduced the concept of having on one Board representation from major interest groups concerned with water pollution control. The Board is made up of three public members, and representatives of five major State agencies -- the Department of Health, the Department of Mines and Mineral Industries, the Department of Forests and Waters, the Department of Commerce, and the Fish Commission. The Secretary of Health is Chairman of the Board.

B. Water Pollution Control Legislation

The first step to control water pollution in the State was taken in the year 1905 when the legislature passed the "Purity of Waters Act". This act prohibited the discharge of sewage to waters of the Commonwealth unless it was the unanimous opinion of the Governor, Attorney General, and Commissioner of Health that the discharge would not create a public health hazard. After the Sanitary Water Board was created in 1923, the powers formerly vested in the Governor, Attorney General and Commissioner of Health by the "Purity of Waters Act" were transferred to the Board.

The second law dealing with stream pollution was passed in 1937. This legislation is commonly referred to as Pennsylvania's Clean Streams Law. This law supplemented and strengthened the authority of the Sanitary Water Board in its administration of the Commonwealth's stream pollution control program. It added provisions for the control of pollution from industrial wastes in addition to pollution from sewage. It did, however, exclude from control acid drainage from mines and silt from coal preparation plants until such time as in the opinion of the Sanitary Water Board practical means for the removal of the pollutional properties of such wastes had become known.

In 1945 the Clean Streams Act was amended to give the Sanitary Water Board jurisdiction over acid mine drainage discharged to or affecting clean waters of the Commonwealth, and removed from the law the exemption previously granted for discharges of silt from coal preparation plants.

C. Sewerage Program

The Sanitary Water Board has the power to issue orders requiring a municipality or a person to abate the discharge of sewage that causes pollution.

To determine if a municipality should receive an order, the Department of Health makes a thorough study of the case and presents its findings to the Board. A public hearing is held and the municipality is given an opportunity to hear the evidence presented by the Department of Health and to present information that it feels is pertinent. All evidence is considered by the Board and an order is issued if the Board finds that sewage is being discharged from a sewer system owned and maintained by the municipality and that the discharge of this sewage "is or may become inimical or injurious to the public health, animal or aquatic life, or the use of the receiving waters for domestic, industrial, or recreational uses".

An order issued by the Board may allow up to two years for the municipality to abate the discharge, and the Board has allowed two years in almost all cases. Compliance with the Board's order may be accomplished by:

1. Constructing treatment facilities so that the treated effluent does not cause pollution.

2. Discontinuing the discharge of sewage. This may be done by discharging the sewage to the sewer system of a municipality that has a treatment plant, or by installing individual subsurface disposal facilities where the case involves small sewage discharges.

After the Board issues an order, it directs the municipality, to submit within 90 days, a schedule outlining its plans for compliance with the order. Where construction of treatment facilities is necessary, the schedule must include dates for submission of plans, advertisement for bids, receipt of bids, award of contracts, beginning of construction, completion of construction, and beginning of operation.

When individuals, corporations, partnerships, and associations are ordered to abate sewage discharges, a hearing is necessary only if requested by the party receiving the order.

If orders are not complied with, the Board takes appropriate legal action to obtain compliance. The powers of the Board in this regard have been reaffirmed in a number of recent court decisions.

D. Industrial Wastes Program

The Clean Streams Law prohibits the discharge of industrial wastes unless a permit for the discharge has been issued by the Sanitary Water Board. The Board may not approve discharges that will cause pollution. Industrial plants that were discharging wastes prior to 1937 must abate or provide treatment when ordered by the Board. Because the Clean Streams Law made it unlawful to begin to discharge wastes without a permit from the Board, orders are not necessary for discharges that have begun since 1937.

When an industrial establishment is found to be in violation of the Commonwealth's Clean Streams Law or the rules and regulations of the Sanitary Water Board, (See Appendix B) a written violation notice is sent by the Department's Regional Office to the responsible company official. The notice includes the date of the violation and a statement on how the information of violation was obtained, the nature of the violation, and the law, regulation, permit condition or order that is being violated. The company is normally given up to thirty days in which to correct the violation or to submit a schedule of steps to be taken to accomplish the correction.

If the company does not correct the violation or produce a satisfactory schedule for correction, or if there have been more than two violations within a six-month period, or if violations have recurred repeatedly in the past, a conference is held in the appropriate Health Department Regional Office. The company is given an opportunity at the conference to show cause why the case should not be referred for legal action. In calling the conference, the responsible company official is advised that he is expected to present a schedule at the conference showing how compliance will be accomplished. If a satisfactory schedule is not submitted at the conference, the case is then referred for legal action.

E. Mine Drainage Program

The mine drainage control program began with the 1945 amendment to the Clean Streams Law which made it illegal to open a new mine or to reopen or continue an existing mine operation without securing approval of a plan of drainage from the Sanitary Water Board. To carry out this program, the Board developed certificate and permit systems for regulating both deep and strip mining.

Persons planning to open or reopen a mine are required to submit an application and a plan of drainage for the proposed operation. The application includes detailed information on the proposed operation. A plan accompanying the application shows the properties that will be affected and an outline of the area to be mined with an indication as to the direction of any anticipated drainage.

When the application is accepted the Department of Mines and Mineral Industries and the Pennsylvania Fish Commission are requested to submit written reports to the Department on the proposed operation. A field investigation is made of the proposed area by the Department of Health.

When the reports from the field investigator, Department of Mines and Mineral Industries, and Fish Commission are received, they are reviewed by the Department and a recommendation is made to the Board.

The Sanitary Water Board issues three types of mine drainage permits -- commonly designated as "A", "C-1" and "C-2". An "A" type permit, in accordance with the Clean Streams Law, allows the discharge of acid drainage to streams already polluted with acid drainage to the extent that the stream is not readily recoverable. A "C-2" type permit allows a limited amount of acid to be discharged, but not in sufficient quantity to affect a secondary or tertiary stream. A "C-1" type permit does not allow any acid to be discharged and is the only type issued on clean streams. Although an "A" or "C-2" type permit allows discharge of acid drainage, good mining practices are required on all operations to minimize the amount of acid which may be developed or discharged. These mining practices include construction of surface water diversion ditches and segregation and burial of acid producing material. Control of drainage by the adoption of good mining practices has been important in our program to abate or minimize acid mine drainage.

Listed below are some of the specific procedures that are used to minimize acid mine drainage; they

1. Require prompt removal of all water from deep and open pit mines by gravity or by pump.
2. Limit the area of pit opened at any one time.
3. Prohibit the disturbing of any stream beds with drainage areas greater than 0.5 square mile above the

mine.

4. Require deep mine drainage to be kept separate from strip mine drainage.

5. Require a complete backfill in certain areas or a backfill in excess of requirements of the law.

6. Limit, restrict or prohibit mining on certain watersheds.

7. Require a special plan of drainage for operations on certain areas.

8. Require leaving the coal seam intact within 15 feet of the coal outcrop.

9. Prohibit mining on clean streams on areas where an acid discharge from previous mining exists or is likely to occur from the proposed operation.

If an application for a permit is refused, the applicant may amend his plan of drainage and resubmit it to the Board for review. If the Board feels that the amended plan of drainage is adequate, it may authorize a permit. If the Board does not approve the amended plan, or if the applicant does not wish to amend his plan, he may request a hearing before the Board. If a Permit is refused as a result of a hearing, the applicant may bring the matter before the Commonwealth Court.

Requiring operators to submit plans of drainage and obtain a permit is one step toward improvement of our streams. This procedure prevents pollution before it begins. Another procedure that is necessary to prevent pollution is an extensive inspection program.

Periodic inspection of active and inactive operations is a major function of Pennsylvania's mine drainage control program. Emphasis is placed on inspection of operations on watersheds of clean streams and streams devoted to extensive public use. The field investigators survey the operations to determine if the operators are complying with permit requirements. Operations found in violation are so notified by the Board, and are given a reasonable time to correct the violations. Where violations are not corrected within this time, permits are then suspended or revoked, and where necessary, legal action is taken to secure compliance.

A recent court decision has upheld the Board's authority to refuse permits on acid streams subject to rehabilitation.

In 1963 the legislature increased the restoration requirements for bituminous strip mines. This restoration should help prevent pollution from these mines. Responsibility for enforcement of the portion of the Clean Streams Law dealing with drainage from bituminous strip mines was transferred from the Department of Health to the Department of Mines and Mineral Industries, effective January 1, 1964.

F. Stream Classification Procedure

The basis for the Sanitary Water Board's sewage and industrial wastes control program is a State-wide system of stream classification.

In order to inaugurate the program, the Board during the summer of 1944 conducted a series of ten hearings at various places throughout the State. Due notice was given to municipal and industrial representatives of the place and time of the hearings for their respective areas. At these hearings, the Chairman of the Board explained in detail the purposes and plans for the State-wide pollution control program. An opportunity was afforded those present to express their views on the subject, either orally at the hearing or in the form of a brief. The Board held classification hearings for the Monongahela River Basin in Pittsburgh on June 20, 1944.

Following these hearings, the Board considered the testimony and classified the streams as to the degree of treatment that would be required for sewage and sewage-like industrial wastes. The Board has also established minimum treatment requirements for other industrial wastes. A summary of the Board's treatment requirements are included in the Rules and Regulations in Appendix B.

After the streams were classified and the minimum degrees of treatment established, official notices were directed by the Sanitary Water Board to municipalities and industries throughout the Commonwealth ordering them to abate their discharge of untreated wastes or prepare plans for the construction of necessary waste treatment facilities.

After allowing time for compliance with this order, the Board began an orderly basin-by-basin program of issuance of orders for construction of treatment works. The program was started in the eastern part of the State and moved westward.

Because of the effect of acid mine drainage on the Monongahela River and a number of its tributaries, they were classified as "primary degree treatment" streams. Changes in the stream quality and the population load at various points has made it necessary, within recent years, to conduct reclassification studies of the Monongahela main stem and the Youghiogheny Basin.

The Monongahela main stem was the subject of the most recent reclassification study. The study began in the summer of 1961 and was completed in August 1963. The Board adopted the recommendations that the treatment requirement be retained. (Intermediate treatment in Allegheny County and primary treatment from the Allegheny County line to the Pennsylvania-West Virginia border.)

Early this past summer, work was started on a study that will consider the reclassification of all the tributaries of the Monongahela except streams in the Youghiogheny River Basin. The streams of the Youghiogheny River Basin were reclassified in 1961. Table 2 lists the present treatment requirements for all the streams in the Monongahela Basin.

G. ORSANCO Requirements

Pennsylvania, as a member of the Ohio River Valley Water Sanitation Commission, has agreed to the ORSANCO recommendations for sewage and industrial waste treatment in the basin.

In a report dated January 10, 1959, ORSANCO recommended that "all sewage discharges into the Monongahela River receive treatment so as to provide for substantially complete removal of settleable solids and the removal of not less than 45 percent of the total suspended solids" (primary treatment). The ORSANCO report further recommended that sewage treatment requirements be more stringent near public water supply intakes. The Sanitary Water Board's sewage treatment requirements meet the ORSANCO recommendations.

ORSANCO's basic industrial waste treatment requirements for the Monongahela River are included in Appendix B (ORSANCO Basic Industrial Waste Requirements, I.W.-1).

The Board's industrial waste treatment requirements are more stringent than the ORSANCO requirements; however, there is no basic conflict in objectives.

IV. PENNSYLVANIA'S USE OF THE RIVER

The Monongahela is one of the most extensively used major rivers in the United States. The principal uses of the waters of the Monongahela Basin are for municipal and industrial water supply and navigation.

Public water purveyors using the Monongahela and its tributaries as a source of supply serve approximately 107 million gallons of water to 815,000 persons in Pennsylvania daily. Public water purveyors using the Monongahela and its tributaries as a source of supply are listed in Table 3, Appendix A.

Because of the poor quality of some of the streams in the basin, extensive treatment of water must be provided before it is served to the customers. This extensive treatment adds to the cost of water to the consumer. The quality problems affecting public water supplies are caused primarily by mine drainage.

Industries use an estimated 2-1/2 billion gallons of water per day from the Monongahela River. The greatest industrial use of the Monongahela is for water for cooling purposes. Two steam power plants located within a five-mile reach near the Allegheny County line use 770 million gallons of cooling water daily, approximately 10 percent of the average river flow. The steel industry complex in Allegheny County also uses large volumes of cooling water. The acid character of the river is undesirable for industrial use because it accelerates corrosion in piping and pumps. The hardness, iron and manganese concentrations are undesirable because they cause excessive scale formation in boilers and piping. These factors increase the cost of water to industrial water users. Table 4, Appendix A, lists the Monongahela River's principal industrial water users.

The river is canalized for its entire length in Pennsylvania and is used heavily for navigation.

Water-based recreation has been limited on the main stem of the Monongahela River by poor water quality, but is expected to increase as the quality improves. A number of tributaries support abundant aquatic life. The use of the Youghiogheny River for recreational purposes is increasing.

V. POLLUTION CONTROL PROGRESS IN THE BASIN

A. Sewerage

All Monongahela Basin municipalities that are served by public sewers are listed in Table 5, Appendix A.

The sewage from some municipalities is pumped outside the basin. They are also included. This table is divided into four sections, according to receiving stream. The sections of this table are:

(1) The main stem of the Youghiogheny River. Included in this list are a few municipalities which discharge sewage to both the Youghiogheny main stem and also to a tributary.

(2) Tributaries of the Youghiogheny River.

(3) The main stem of the Monongahela River. Included in this list are a few municipalities which discharge sewage to both the Monongahela main stem and also to a tributary.

(4) Tributaries of the Monongahela River except the Youghiogheny River Basin.

Townships and cities are indicated as such, while no designation is listed for boroughs. "Sewered Population" is the estimated number of people served by sewers in the municipality.

"Administrative Status" gives data on the status of Sanitary Water Board action to obtain treatment for sewage discharges. An "X" shows that a hearing has been held. (This includes the December 1963 hearings which were held yesterday). A (1) means that a hearing will be held as soon as possible. Most of the indicated hearings have been held within the past few years.

An order for construction of treatment facilities is indicated by an "X" in the appropriate column. Most of the orders that were issued as a result of the 1944 stream classification program required only the preparation of plans for treatment facilities. This was considered as a first step in abating the discharge. Such orders are represented by "X_p". In some of the cases for which hearings have been held, adjudications are now being prepared. In a few cases legal action to enforce an order is under way, as indicated by an "X".

"Project Status" lists information concerning sewage treatment facilities. Many municipalities discharging untreated sewage have plans for treatment facilities, although in some cases these are old and in need of revision. An "X" in the "Plant in Operation" column shows that treatment facilities are in operation, while "X_A" indicates that the municipality's sewage is treated by another municipality or authority. "X_B" is used where some sewage is treated by the municipality and some is treated by another municipality or authority. Except for cases listed under "Legal Action", dates are given for the expected start of treatment plant operation. Dates are taken from schedules submitted by the municipalities. In cases where shcedules have not yet been submitted the Department has made estimates of the expected date for the start of plant operation. These estimates are indicated by an "E" in the table.

"Degree of Treatment Required" indicates the Sanitary Water Board treatment requirements for effluents discharged by the receiving stream.

There are 133 sewered municipalities in the Pennsylvania portion of the Monongahela River Basin serving 894,595 people. Fifty-seven municipalities are served by sewage treatment facilities and have invested approximately $45 million in these facilities. These facilities serve 78.5 percent of the sewered population.

Of the remaining municipalities not yet providing treatment, 7 are constructing treatment plants and the remainder are either under Sanitary Water Board orders or will soon receive them.

We estimate that it will take approximately $18.5 million to provide the needed sewage treatment facilities.

B. Industrial Wastes

Table 6, Appendix A, includes the name and location of every known industrial establishment discharging wastes to the Monongahela River Basin in Pennsylvania. The tables indicate the administrative status, project status, and anticipated compliance date for abatement or construction of waste treatment works for discharges that are at present in violation of our requirements. The tables indicate the status as of November 1, 1963.

The "Administrative Status" lists the step in the enforcement procedure that has been reached in each case. Because the Clean Streams Law made it unlawful to discharge industrial wastes without a permit from the Board, orders are not necessary for discharges that began after 1937.

"Project Status" lists the step that has been reached in the abatement or construction schedule. For cases where no schedule has been submitted, the anticipated compliance date is the Department's estimate of when compliance will be accomplished.

In 1944 when the Board originally classified the streams of the basin for treatment, there were practically no industries providing treatment. At the present time, there are 177 industrial plants discharging wastes to the Monongahela Basin in Pennsylvania. One hundred twenty-five or 71 percent are providing adequate treatment, 39 or 22 percent have submitted satisfactory schedules for treating or abating discharges, and 13 or 7 percent are not making satisfactory progress toward compliance.

C. Mine Drainage

Bituminous coal has been mined in the Monongahela River Basin for more than 200 years. Legislation controlling mine drainage has been in effect for only the last 18 years. Much of the Basin's coal production took place prior to the passage of the act. Through September 30, 1963, the Board has processed 104 reports and 1,721 applications on the Watershed. The following is a breakdown of Board action:

Certificates Issued	104
"A" Permits Issued	821
"C-2" Permits Issued	134
"C-1" Permits Issued	624
Permits Refused	112
Applications Returned Without Action	30
Total	1,825

Our records indicate that there are some 3,200 active, inactive and abandoned mines on the watershed. We know that there are many more mines in the watershed for which we have no records of their location or drainage. According to our records and those compiled by the Works Progress Administration, there are 520 abandoned mines located on the Pennsylvania portion of the watershed discharging 480,000 tons of acid each year. This is an average of 1,314 tons per day. Of these, 189 are each discharging more than 100 tons of acid yearly. The abandoned Crow's Nest Mine in Hempfield Township, Westmoreland County, had the largest single discharge of 39,166 tons of acid per year. Table 7, Appendix A, lists the abandoned mines discharging more than 1,000 tons of acid per year.

Table 8, Appendix A, lists the larger active mines that are discharging appreciable amounts of acid mine drainage in the basin.

Considerable mine sealing was done during the 1930's by the Works Progress Administration. Improvement in the quality of a number of streams following completion of the sealing program indicates that the program may have been at least partially effective, as was pointed out by Mr. Shaw. We do not know of any follow-up program that was carried out to maintain the seals or to evaluate their effectiveness. We feel that evaluation of any such work is necessary to arrive at conclusions as to the effectiveness of such a program.

Coal mining on the Monongahela watershed has decreased considerably over the past 18 years. In 1945, some 51 million tons of coal were mined on the watershed. In 1962, only 16.6 million tons were mined. During this period, approximately 10 percent of the coal produced was by strip mining methods. Unfortunately acid mine drainage has not decreased proportionately with the reduction in mining.

Approximately 382 miles of streams on the watershed in Pennsylvania were already acid polluted on January 1, 1944. Some of this pollution originates in other States.

Pennsylvania's Clean Streams Law allows the discharge of acid mine drainage from new or reopened mines on these already polluted streams where no public use would be affected. We have further required mine operators to follow good mining practices as outlined in Section III-E to minimize formation and discharge of acid.

Our Clean Streams Law clearly prohibits the discharge of acid mine drainage to "clean waters" of the Commonwealth. It also prohibits acid mine drainage into unclean waters where public use of these waters may be adversely affected.

By these means we have controlled further pollution from active mines, but these measures have little or no appreciable effect on the problems caused by discharge of large volumes of acid drainage from mining operations that were discontinued prior to 1945.

VI. WATER QUALITY

This discussion of water quality in the basin deals primarily with the quality of the main stem of the Monongahela River and the Youghiogheny River, its principal tributary in Pennsylvania. Some localized water quality problems exist in the other tributaries; however, as in the case with the Monongahela, by far the most serious pollution problems in the basin result from mine drainage discharges.

A. Acidity

The acid character of the main stem of the Monongahela River and many of its tributaries is the most serious water quality problem in the basin. This problem is definitely not a new one in Pennsylvania. Early histories of Western Pennsylvania mention the acid character of springs which drained coal deposits, indicating that acid from coal deposits was entering the streams in the Monongahela Basin even before the opening of the first bituminous mine in the Commonwealth on Coal Hill (Mount Washington) in 1761. The drainage from the thousands of mines that were subsequently opened in the basin eventually overcame the assimilative capacity of many streams in the basin, turning them acid.

Variation in acid concentration at several stations on the Monongahela and Youghiogheny Rivers is illustrated on Figures 1 through 4 in Appendix A. These figures cover the period 1950 through 1963. Tables 9 and 10 are tabulations of the alkalinity, acidity and hardness at the McKeesport Water Works intakes on the Monongahela and Youghiogheny Rivers for the period 1911 through 1962.

Figures 1 through 4 indicate no significant trend at three of the four stations. The Youghiogheny River at the

Youghiogheny Dam has improved slightly.

The data at the McKeesport water works shows a definite trend for improvement in the Youghiogheny River over the period of record. It shows an increase in acidity for the Monongahela River up to the early 1930's, and then a gradual decrease in the acidity from that time to the present. We attribute these variations in the acidity in the stream to several factors.

One of the factors which undoubtedly contributed to the changes which occurred was the abandonment of many large coal mines in some of the inland areas during the late 1920's and in the 1930's, and the movement of much of the mining to areas where river transportation for hauling of coal was available. Another factor which must be given some consideration is the extensive program of sealing of abandoned coal mines in the bituminous region from 1934 to 1938, inclusive.

Another factor which undoubtedly has a bearing on the water quality improvement shown in recent years is the operation of multipurpose reservoirs on the Monongahela River at the Tygart Dam and on the Youghiogheny River at the Youghiogheny Dam near Confluence. Each of these multipurpose dams releases water for flow augmentation during low periods in the streams. The Tygart Dam reduces the daily fluctuations of acidity and hardness in the Monongahela River and supplies a water of a more uniform quality during low flow periods.

The Tygart Dam was placed in operation about 1938.

The Youghiogheny River dam was placed in operation about 1948 and water quality in the Youghiogheny River has shown a very decided improvement since 1948. Operation of other reservoirs in the Monongahela River Watershed for flood control purposes may also have had some effect in ironing out quality variations previously encountered.

In addition to its effect on the Monongahela and Youghiogheny Rivers, mine drainage has a serious effect on a number of smaller streams in the Pennsylvania portion of the basin. Table 11 lists the streams affected by acid mine drainage and the number of miles of stream that are considered to be acid under the Sanitary Water Board definition. (See Sanitary Water Board Rules and Regulations in Appendix B.)

We have observed improvement in the quality of a number of streams in the basin, primarily as a result of closing of mines in the basin and the mine sealing operations of the 1930's.

In addition to the acid contributed by mine drainage, a significant amount of acid in the form of waste acid pickle liquor from the steel industry was being discharged to the river at the time of passage of the Clean Streams Law. In 1950 the Sanitary Water Board adopted regulations limiting the amount of pickle liquor discharged from metallurgical plants, and enforcement of this regulation has had a positive effect in reducing acidity, in both the Youghiogheny and the Monongahela.

Neutralization and return to the river of water used for municipal and industrial purposes has had the effect of neutralizing some of the acid in the river; however, this is not primarily a pollution control measure.

In addition to the effects of acidity, discharges from mining operations also increase the hardness of many streams in the Monongahela Basin and reduce the desirability of the water as a source of municipal and industrial water supply.

B. Biological and Bacteriological Conditions

The acid condition of the main stem of the Monongahela has a depressing effect on the biological activity in the stream. Fish and other aquatic life are found only where clean tributaries join the main stem of the river. A relatively normal aquatic population is found only within the zone of influence of the tributary stream.

The acid character of the stream tends to limit the number of viable coliform bacteria in the stream.

Our water quality network analyses indicate that coliform levels in the Monongahela River and the Youghiogheny River are well below our recommended standards for bathing beaches (1,000 MPN/100 cc), and ORSANCO requirements for raw water for public water supplies (5,000 MPN/100 cc).

To our knowledge, no conclusive research has been done on the effect of acid mine drainage on the rate of satisfaction of the oxygen demand of wastes in a stream. However, it is reasonable to assume that the acid mine drainage slows down the rate of biological decomposition of the organic matter and results in a more gradual oxygen demand on the stream. This assumption is substantiated by measurements of dissolved oxygen concentration in the Monongahela River at points influenced by organic waste discharges.

C. Dissolved Oxygen Conditions

The dissolved oxygen conditions recorded at our water quality network stations on the Monongahela and Youghiogheny Rivers over the past years have varied with changes in the water temperatures; however, the concentration has remained close to the saturation value at all stations.

A survey made by the U.S. Public Health Service in 1940 indicated that a zone of low dissolved oxygen existed near the mouth of the Monongahela. This condition was caused by an oxygen demand exerted by untreated sewage discharges from Pittsburgh and surrounding municipalities in the Monongahela Basin. Sewage from this area is now carried to the Allegheny County Sanitary Authority sewage treatment plant for intermediate treatment prior to discharge to the Ohio River. Dissolved oxygen concentrations in this zone are now close to saturation.

D. Taste and Odor Producing Substances

Public water purveyors using the main stem of the Monongahela River as a source of supply have, in the past, experienced serious difficulties with taste and odor producing substances in their raw water supply. Upstream from the Allegheny County line the problem appears sporadically. Downstream from the Allegheny County line, phenolic taste and odor producing substances are presently practically all of the time. Phenol concentrations at Braddock normally exceed the 0.001 mg/1 recommended as an upper limit by the U.S. Public Health Service 1962 Drinking Water Standards.

Many industrial establishments in the basin have taken steps to reduce the amount of phenolic material discharged with their waste water. The number of reported taste and odor problems has decreased in recent years and we feel that progress is being made. We are continuing to work toward eliminating this problem.

E. Iron and Manganese

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Iron and manganese are undesirable constituents of mine drainage and of wastes discharged to the stream from metallurgical plants. Our records indicate that the contribution from metallurgical plants is small as compared to the mine drainage contribution. High iron and manganese concentrations make the water of the Monongahela River and several other tributaries unattractive from an aesthetic aspect and reduce their desirability as sources of public and industrial water supply and for recreational use.

Iron and manganese concentrations in the Monongahela River and many of its tributaries greatly exceed the maximum suggested concentration for public water supplies as set in the 1962 U.S. Public Health Service Drinking Water Standards. Concentrations that "should not" be exceeded in public water supplies are 0.3 and 0.05 mg/l for iron and manganese, respectively.

Iron concentrations in the Monongahela at Braddock in six (6) samples collected at three-month intervals from June 1962 through September 1963, ranged from 0.4 to 7.6 mg/l, with the average concentration of 3.1 mg/l.

Manganese concentrations at the Braddock station for the same period ranged from 0 to 1.3 mg/l, and averaged 0.5 mg/l. These concentrations are typical for the entire main stem of the Monongahela in Pennsylvania.

Mine drainage discharges must be reduced, these objectionable constituents must be removed and additional flow augmentation provided, if the Monongahela is to meet the desirable quality levels for water uses in the basin.

F. Oil

Periodic oil spills from the heavy industry that lines the banks of the lower reaches of the Monongahela are a continuing problem. Industry has been cooperative in making in-plant changes to prevent accidental spills. We feel, however, that more progress can be made and should be in this area.

G. Temperature

The increase in temperature of streams of the Commonwealth as a result of heated waste water discharges has been of concern to us for the past several years. In 1962, the Sanitary Water Board approved Rules and Regulations limiting discharges of heated waste water to waters of the Common-of discharges of cooling water from steam power plants in the area. The rise in temperature has not been sufficient to affect other water users; however, we will continue to observe temperature conditions in this area and will take action to control the temperatures when it becomes necessary.

VII. POLLUTION ABATEMENT PLANS

A. Sewerage

Action is being taken to obtain treatment for all municipal sewage discharges in the basin. If the municipalities do not comply with the Sanitary Water Board's orders, legal action will be taken. We expect that within a few years practically all sewage from the Pennsylvania portion of the basin will be treated prior to discharge.

B. Industrial Wastes

The status of industrial plants located on tributaries of the Monongahela River, as listed in Table 6, Appendix A, indicates that almost all plants are complying with our requirements. The major problem area remaining is the heavy steel industry located along the main stem of the

Monongahela River in Allegheny County.

Pickle liquor and acid rinse discharges have been abated at all the mills. Oil and other pollutants affecting the appearance of the effluents are the major remaining problems. With the increasing recreational use of the river, freedom from floating scums and oil slicks is essential and abatement progress is being made.

An obstacle to some pollution control efforts, both by our Department and industry, is uncertainty as to the source of all wastes discharged from a given outfall pipe. Some plants have as many as 40-50 separate discharges. In our current enforcement work, we are asking each mill to submit accurate information on the quality and quantity of the discharges as well as on the sources of contaminants. With this information we will be able to detect the sources of the remaining pollutants and take action to have them abated.

We plan to use our enforcement powers to secure compliance for the remaining untreated discharges. Dates by which compliance at each plant now in violation will be secured are listed in Table 6, Appendix A. Some of the dates were submitted by the firms involved; where no schedule has yet been submitted, the dates are our estimates of the time required for correction.

In several cases, no compliance date has been specified. Administrative conferences are planned for December 1963, and January and February 1964. The companies have not submitted schedules and it is not possible for us to estimate compliance dates in these cases since legal action may be required.

C. Mine Drainage

Pollution abatement plans in connection with mine drainage in the basin generally fall into two categories. One is development of further technology in the field of mine drainage control. To increase skill in this regard the Pennsylvania Sanitary Water Board in 1946 initiated mine drainage research at the Mellon Institute. The research was later carried out on a cooperative basis between the Board and industry. Industry has continued to sponsor research at the Mellon Institute. This research has been responsible for much of the present knowledge of mine drainage control.

During June 1963, the Department of Health submitted an application to the U.S. Public Health Service for a demonstration grant involving abatement of existing pollution on a specific watershed to evaluate the effectiveness of certain pollution abatement methods. We estimate that approximately $175,000 will ultimately be needed to complete this project. We have so far had no reply from the Public Health Service concerning this application. A previous application of a somewhat similar nature was disapproved by the Public Health Service.

The Christopher Coal Company, a subsidiary of Consolidation Coal Company, is presently deep mining on the watershed plan designed to minimize the discharge of acid mine drainage. This project has been under way for seven years; but the results so far are inconclusive.

The Bureau of Mines of the Department of the Interior has just initiated a research project involving the sealing of a deep mine to determine the effectiveness of such sealing where mining has been done above drainage level. This project is being carried out in cooperation with the Coal Industry Advisory Committee of ORSANCO.

Through its strip mine restoration program, the Pennsylvania Department of Mines and Mineral Industries has amply demonstrated that pollution can be abated by appropriate restoration of abandoned bituminous strip mines.

We have, on a number of occasions, discussed with members of the Public Health Service and the Bureau of Mines, the urgency of developing mine drainage control demonstration projects in Pennsylvania.

During June of 1962, Pennsylvania' Sanitary Water

Board and the Department of Health sponsored a National Mine Drainage Symposium for the purpose of exchanging the latest knowledge in this field, and that was held right here in this hotel.

At every opportunity members of the Department of Health and of the Sanitary Water Board have urged congressional committees to make funds available for research and demonstration projects in the mine drainage pollution abatement field. We feel that there is great need to expand efforts, particularly at the Federal level, to improve our knowledge and skill in this field.

The second category relating to the mine drainage pollution lies in the actual abatement of pollution from active and abandoned mines. Many times as many tons of acid are discharged in Pennsylvania from abandoned coal mines as are discharged from active coal mines. The first step in abatement of pollution from these mines is to locate all of these mines and accurately determine the amount of pollution which is presently emanating from each of these mines. The next step would be to select a number of watersheds and initiate actual abatement procedures. This would involve a large public works type project and a large expenditure. It is not likely that the Commonwealth of Pennsylvania can bear a significant portion of the burden. Considerable financial assistance from the Federal Government would be needed to carry out such a project.

Abatement of pollution from the small number of active deep mines now adding iron and acidity to the waters of the Monongahela is another problem. The majority of these mines discharge to streams that are polluted by acid mine drainage from abandoned mines, so even if their pollution were to be abated, no significant improvement in stream quality would be accomplished unless pollution from the abandoned mines was also abated. A number of these active mines pump water which originates not only in their own operations, but some from adjoining abandoned operations. The burden of abating any pollution from such mines is unusually heavy and should, in our opinion, not fall on the mine operator alone. As a matter of fact, in the anthracite field a precedent in Federal and State policy has been set by providing governmental funds for installation of pumps which would assist the operator in removing such excessive amounts of water. The Sanitary Water Board has expressed the hope that this philosophy can be expanded to treatment of mine waters which originate from abandoned mines but which must be pumped in order to maintain active mines.

One of our next efforts in the mine drainage pollution abatement program in the Monongahela River Basin will be to locate streams where most of the pollution comes from active mines and determine the steps necessary to abate the pollution. We have already made the field investigations for such a study in the Slippery Rock Creek Watershed in the Allegheny River Basin.

VIII. CONCLUSIONS

Pennsylvania has had an active water pollution control program since the creation of the Sanitary Water Board in 1923, and the passage of the Clean Streams Act in 1937. Until 1945, the water pollution control activities were limited to sewage and industrial wastes. Since 1945 we have had a mine drainage control program.

We feel that good progress has been made in abating pollution from sewage and industrial wastes in the Monongahela River Basin. More than three-fourths of the basin's sewered population of almost 900,000 is served by sewage treatment facilities. Ninety-three percent of the industries in the basin are in compliance or are making satisfactory progress toward compliance with Sanitary Water Board requirements. We are continuing to secure compliance of the remaining municipalities and industries that have not yet provided satisfactory treatment of their wastes.

Our Clean Streams Law and our mine drainage control program have enabled us to hold the line against additional pollution from acid mine drainage on streams that are not acid.

The major remaining water quality problem in the basin is caused by acid mine drainage. The river is used intensively as a source of municipal and industrial water supply and navigation; but acid mine drainage adversely affects all uses of the river. Most of this pollution arises from discharges from abandoned mines.

Coliform bacteria levels in the Monongahela River and Youghiogheny River in Pennsylvania are better than our recommended standards for bathing beaches, and ORSANCO requirements for raw water for public water supplies. Dissolved oxygen levels of these streams are near saturation.

We are working to eliminate the remaining taste and odor and oil problems of the basin.

Our strip mining law has been amended to require additional backfilling, and this in addition to our present control program, will help to continue to prevent pollution from new operations. Research, demonstration and public works projects are needed to help solve the problem of pollution from abandoned mines. Due to the large expenditures required for such projects, it would seem that Federal assistance is needed to carry out the projects.

APPENDIX A

TABLE 1
STREAM FLOW DATA

MONONGAHELA RIVER GAGING STATIONS

Gaging Station	Drainage Area (Sq. Mi.)	Years of Record	Avg.	Discharges Max.	(cfs) Min.
Greensboro, Pa.	4407	23	8,203	140,000	204
Charleroi, Pa.	5213	28	9,056	140,000	302
Braddock, Pa.	7337	23	12,500	201,000	559
YOUGHIOGHENY RIVER GAGING STATIONS					
Youghiogheny River Dam	436	23	851	13,700	--
Confluence, Pa.	1029	22	1,956	69,050	40
Connellsville, Pa.	1326	54	2,515	103,000	11
Sutersville, Pa.	1715	42	2,962	108,000	57

TABLE 2
SANITARY WATER BOARD
STREAM CLASSIFICATIONS
MONONGAHELA RIVER BASIN

Stream	Treatment Required	From	To
Monongahela River	Primary	W. Va. State Line	Allegheny Co. Line
Monongahela River	Intermediate	Allegheny Co. Line	Mouth
Youghiogheny River	Primary	Maryland State Line	Allegheny Co. Line
Youghiogheny River	Intermediate	Allegheny Co. Line	Mouth
Sewickley Creek	Primary	Brinkers Run	Mouth
Casselman River	Primary	Piney Run	Mouth
Buffalo Creek	Primary	Source	Miller Run
Redstone Creek	Primary	Coal Lick Run	Mouth
Dunkard Creek	Primary	W. Va. State Line	Mouth
Cheat River	Primary	W. Va. State Line	Mouth

Complete treatment is required on all other streams in the basin and in the remaining portions of streams included in this table.

TABLE 3
PUBLIC WATER PURVEYORS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Water Works Name and Location	Population Served	Average Consumption MGD	Treatment*
Allegheny County			
Braddock Municipal Water Works Braddock, Pa.	12,500	2.0	F.D.
Monongahela Valley Water Corp. Elizabeth, Pa.	36,000	4.5	F.D.
North Versailles Twp. Water Auth. North Versailles Twp., Pa.	3,000	0.7	F.D.
South Pittsburgh Water Company Carrick, Pa.	300,000	45.0	F. F S L
Fayette County			
Belle Vernon Municipal Auth. Belle Vernon, Pa.	6,500	0.4	F D
Brownsville Water Company Brownsville, Pa.	12,000	1.0	F D
Washington Twp. Municipal Auth. Fayette City, Pa.	7,000	0.5	F D
Southwestern Pa. Water Auth. German Twp., Pa.	10,000	1.8	F D
National Mines Corp. Luzerne Twp., Pa.	1,100	0.125	F D
Masontown Water Company Masontown, Pa.	5,000	0.5	F D
Greene County			
Carmichaels Municipal Auth. Carmichaels, Pa.	2,000	0.2	F D
Dunkard Valley Joint Municipal Auth. Greensboro, Pa.	1,600	0.07	F D
Alicia Water Company Monongahela Twp., Pa.	200	0.01	F D
U. S. Steel Corp. Monongahela Twp., Pa.	1,500	0.90	F D

TABLE 3
PUBLIC WATER PURVEYORS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Water Works Name and Location	Population Served	Average Consumption MGD	Treatment*
Washington County			
California Water Company California, Pa.	3,000	0.2	F D
Charleroi Municipal Auth. Charleroi, Pa.	60,000	6.0	F D
Tri-County Joint Municipal Auth. E. Bethlehem Twp., Pa.	3,500	0.6	F D
Monongahela City Water Company Monongahela, Pa.	11,500	1.5	F D
West Penn Power Company Union Twp., Pa.	575	0.02	F S D
South Pittsburgh Water Company Union Twp., Pa.	100,000	16.0	F S D

TABLE 3
PUBLIC WATER PURVEYORS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER (EXCEPT YOUGHIOGHENY RIVER)

Water Works Name and Location	Stream	Population Served	Average Consumption MGD	Treatment*
Fayette County				
Fairchance Water Works Fairchance, Pa.	Cave Hollow Run	3,000	0.1	D
Redstone Water Company Franklin Twp., Pa.	Frazer Run) Allen Run) Indian Creek)	4,000	0.3	F D
Springhill Water Company Point Marion, Pa.	Cheat River	2,100	0.1	D
Royal Allison Water Company Redstone Twp., Pa.	Trib. to Dunlap Creek	1,200	0.075	F D
Smithfield Municipal Water Works Smithfield, Pa.	Hector Run	2,000	0.1	D
Uniontown Water Company Uniontown, Pa.	Coolspring Run) Hutchinson Run) Youghiogheny River)	27,900	2.9	F Fl D
Greene County				
Shannopin Water Company Dunkard Twp., Pa.	Dunkard Creek	2,000	0.075	F D
Brave Water and Sewer Auth. Wayne Twp., Pa.	Dunkard Creek	400	0.01	F S D
Waynesburg Water Company Waynesburg, Pa.	Browns Run	16,000	0.5	F D
Washington County				
Bentleyville Municipal Water Works Bentleyville, Pa.	Pigeon Creek	3,500	0.1	F S D
Ellsworth Boro Water Works Ellsworth, Pa.	Pigeon Creek	2,300	0.17	F S D
Bethlehem Mines Corp. Somerset Twp., Pa.	Pigeon Creek	500	0.2	F S D
Bethlehem Mines Corp. Marianna, Pa.	Ten Mile Creek	2,000	0.35	F S D

TABLE 3
PUBLIC WATER PURVEYORS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE YOUGHIOGHENY RIVER

Water Works Name and Location	Population Served	Average Consumption MGD	Treatment*
legheny County			
Elizabeth Twp. Water Auth. Elizabeth Twp., Pa.	10,000	0.6	F D
McKeesport Municipal Water Works McKeesport, Pa.	70,000	9.0	F D
Fayette County			
Connellsville Water Company Connellsville, Pa.	20,000	2.5	F D
North Fayette County Municipal Auth. Dunbar Twp., Pa.	5,000	2.0	F D
H. Weiss and Sons Perry Twp., Pa.	1,875	0.1	F D
Westmoreland County			
Pricedale Water Company Rostraver Twp., Pa.	400	0.02	F D
Smithton Municipal Water Works Smithton, Pa.	900	0.04	F D

TABLE 3
PUBLIC WATER PURVEYORS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Water Works Name and Location	Stream	Population Served	Average Consumption MGD	Treatment*
Fayette County				
Washington Run Water Works Perry Twp., Pa.	Washington Run	375	0.2	F D
Somerset County				
Citizens Water Company Confluence, Pa.	Drakes Run	1,000	0.06	D
Garrett Water Company Garrett, Pa.	Piney Run	750	0.03	D
Meyersdale Water Authority Meyersdale, Pa.	Sand Spring Run) Big Stamm Run)	3,400	0.3	D
Westmoreland County				
Herminie Water District Sewickley Twp., Pa.	Howells Run	3,000	0.1	F D
Westmoreland Co. Municipal Auth. Greensburg, Pa.	Jacobs Creek and Tributaries Twp. Line Run and other Tribs. of Sewickley Creek	60,000	5.5	F D
	TOTAL FOR BASIN	814,600	107.5	

* Key

F - Filtration
Fl - Fluoridation
S - Softening
D - Chlorination

TABLE 4
INDUSTRIAL WATER USE
MONONGAHELA RIVER

Industry	Location	County	Quantity Million gallons/day
Pgh. & Lake Erie R.R.	Pittsburgh	Allegheny	0.2
C. G. Hussey	Pittsburgh	Allegheny	1.7
A. M. Byers	Pittsburgh	Allegheny	1.5
J. & L. Steel	Pittsburgh	Allegheny	446.4
U.S. Steel	Homestead	Allegheny	120.0
U.S. Steel Carrie Furnace	Rankin	Allegheny	166.0
U.S. Steel - Irvin	W. Mifflin	Allegheny	45.0
U.S. Steel	Duquesne	Allegheny	165.0
U.S. Steel National Tube	McKeesport	Allegheny	114.0
F Ind. Chemical	Clairton	Allegheny	4.0
U.S. Steel By-Products	Clairton	Allegheny	146.0
U.S. Steel	Clairton	Allegheny	55.0
Ligget Spring & Axle	Forward Twp.	Allegheny	0.2
West Penn Power Co.	Union Twp.	Washington	250.0
Duquesne Light Co.	Union Twp.	Washington	519.7
U.S. Steel Coal Washery	New Eagle	Washington	0.3
U.S. Steel - American Steel & Wire	Donora	Washington	21.8
Pgh. Steel	Monessen	Westmoreland	180.0
Pgh. Steel	Allenport	Washington	65.0
F . & Lake Erie R.R.	Newell	Fayette	0.2
General Chemical	Newell	Fayette	8.6
J. & L. Vesta Shannopin Coal	Luzerne Twp.	Fayette	0.7
U.S. Steel Edgar Thompson	N. Braddock	Allegheny	166.0

TABLE 4 (Cont'd.)
INDUSTRIAL WATER USE
MONONGAHELA RIVER

Industry	Location	County	Quantity Million gallons/day
Buckeye Coal Washery	Cumberland Twp.	Greene	0.3
Mathies Coal Washery	Union Twp.	Washington	0.2
U.S. Steel Frick Coal Washery	Monongahela Twp.	Greene	1.5
National Mines Corp.	Luzerne Twp.	Fayette	0.2
		Total	2,473.5

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

MAIN STEM OF THE MONONGAHELA RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Point Marion	Fayette	560	X	X		X			12/65 E	P
Greensboro	Greene	50	X	X		X			12/65 E	P
Nicholson Twp.	Fayette	100	(1)						7/66 E	P
Rice's Landing	Greene	150*	X	X_p					2/66 E	P
Luzerne Twp.	Fayette	1,000	(1)	X_p					7/66 E	P
E. Bethlehem Twp.	Washington	150	X	X_p		X			2/66 E	P
Brownsville	Fayette	6,000	X	X			X		12/65 E	P
W. Brownsville	Washington	1,500	X	X					12/65 E	P
California	Washington	2,970	X	X		X			12/65 E	P
Newell	Fayette	150	X	X					2/66 E	F
Elco	Washington	500	X	X					12/65 E	P
Roscoe	Washington	1,300	X	X					12/65 E	P
Allenport	Washington	400	X	X		X			12/65 E	P
Stockdale	Washington	800	X	X		X			12/65 E	P
Fayette City	Fayette	875	X	X			X		12/65 E	P
Dunlevy	Washington	400	X	X		X			12/65 E	P
Speers	Washington	800	X	X		X			12/65 E	P
Twilight	Washington	300**							12/65 E	P

* Also discharge to a Monongahela Trib.
** Sewage discharged to Speers sewer system.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

MAIN STEM OF THE MONONGAHELA RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Belle Vernon	Fayette	1,770	X	X			X		12/65 E	P
N. Belle Vernon	Westmoreland	2,850*	X	X_p			X		1/66 E	P
Charleroi	Washington	8,090	X	X		X			12/65 E	P
N. Charleroi	Washington	2,260	X	X					12/65 E	P
City of Monessen	Westmoreland	18,000	X	X			X		12/65 E	P
Rostraver Twp.	Westmoreland	320	X	X_p			X		2/66 E	P
Donora	Washington	11,100	X	X		X			12/65 E	P
City of Monongahela	Washington	7,800	X	X			X		12/65 E	P
New Eagle	Washington	1,900	X	X			X		12/65 E	P
Forward Twp.	Allegheny	250							X_A	I
West Elizabeth	Allegheny	920	X	X		X			12/65 E	I
Elizabeth	Allegheny	2,600							X	I
Glassport	Allegheny	7,150	X	X				X	9/64	I
Port Vue	Allegheny	4,650	(1)	X**					X_A	I
Dravosburg	Allegheny	2,000	X	X			X		1/66 E	I
McKeesport	Allegheny	44,000							X_A	I
City of Duquesne	Allegheny	14,300		X				X	11/63	I

* Also discharges to a Monongahela Trib.
** Portion of Boro not served by treatment plant.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

MAIN STEM OF THE MONONGAHELA RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Braddock	Allegheny	12,300							X_A	I
Rankin	Allegheny	5,100							X_A	I
West Mifflin	Allegheny	28,000 *	X	X					X	I
Homestead	Allegheny	7,500							X_A	I
City of Pittsburgh	Allegheny	300,000							X_A	I

* Part of Boro not connected to treatment plant.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

MAIN STEM OF THE YOUGHIOGHENY RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Ohiopyle	Fayette	140	(1)	X_p					3/66 E	P
S. Connellsville	Fayette	2,250							X	P
Connellsville Twp.	Fayette	500							X_A	P
City of Connellsville	Fayette	12,800							X	P
Dawson	Fayette	700	X	X_p			X		2/66 E	P
Vanderbilt	Fayette	400	X	X_p			X		2/66 E	P
Smithton	Westmoreland	650	X	X	X	X				P
W. Newton	Westmoreland	2,760	X	X			X		5/65	P
Elizabeth Twp.	Allegheny	7,000							X_B	I
Versailles	Allegheny	2,300							X_A	I
Liberty	Allegheny	3,500							X_B	I

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Salisbury	Somerset	200	(1)	Xp			X		7/66 E	C
Meyersdale	Somerset	2,500	X	X			X		5/65 E	P
Berlin	Somerset	1,600							X	P
Garrett	Somerset	480	(1)						7/66 E	P
Somerset	Somerset	6,300							X	C
Rockwood	Somerset	1,000	X	X				X	8/64	P
Confluence	Somerset	250	X	X	X					P
Dunbar	Fayette	800	X	Xp		X			2/66 E	C
Dunbar Twp.	Fayette	200	X			X			2/66	C
Perryopolis	Fayette	1,800							X	C
Mt. Pleasant Twp.	Westmoreland	1,800	X	X		X			7/65XA	C
Mt. Pleasant	Westmoreland	6,100	X	X			X		7/65	C
Scottdale	Westmoreland	6,200	X	X			X		5/65 E	C
Everson	Fayette	1,300	X	X			X		5/65 E	C
City of Greensburg	Westmoreland	17,400		X				X	5/64	C
S.W. Greensburg	Westmoreland	3,260		X				X_A	5/64	C
South Greensburg	Westmoreland	3,050		X				X_A	5/64	C
Youngwood	Westmoreland	2,500	X	X			X		5/65 E	C

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Hempfield Twp.	Westmoreland	5,000	X*						X	C
White Oak	Allegheny	6,160							X_A	C

*200 persons not served by treatment facilities.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN

TRIBUTARIES OF THE MONONGAHELA RIVER (EXCEPT YOUGHIOGHENY RIVER)

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Wayne Twp.	Greene	150	(1)	X_p					7/66 E	C
Perry Twp.	Greene	100	X	X_p			X		2/66 E	P
Dunkard Twp.	Greene	1,100							X	P
Fairchance	Fayette	200	X	X_p			X		2/66 E	P
Smithfield	Fayette	470	X						2/66 E	C
Masontown	Fayette	4,250	X	X_p			X		2/66 E	P
Cumberland Twp.	Greene	1,400*							2/66 E	P
Carmichaels	Greene	200	X	X_p			X		2/66 E	P
Franklin Twp.	Greene	530							X_A	C
Waynesburg	Greene	5,200							X	C
Jefferson Twp.	Greene	100	(1)**						X	C
Jefferson	Greene	50	(1)	X_p					7/66	C
Tea Garden Homes Auth. Morgan Twp.	Greene	600							X	P
Clarksville	Greene	80	(1)	X_p			X		7/66 E	C
Marianna	Washington	1,090	X	X_p		X			2/66 E	C

* Discharges to Carmichaels sewer system.
** Primary treatment only provided.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER (EXCEPT YOUGHIOGHENY RIVER)

			Administrative Status			Project Status				
Municipality	County	Sewered Population	Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	Degree of Treatment Provided
Centerville	Washington	1,200							X	P
South Union Twp.	Fayette	800	(1)			X			7/66 E	P
North Union Twp.	Fayette	570	(1)	X_p			X		7/66 E	P
City of Uniontown	Fayette	17,500							X	P
Menallen Twp.	Fayette	1,400	(1)						7/66 E	C
Franklin Twp.	Fayette	1,400	(1)						7/66 E	P
Redstone Twp.	Fayette	600							X	C
Brownsville Twp.	Fayette	360	X	X_p					2/66 E	P
West Pike Run Twp.	Washington	600	(1)	X_p			X		7/66 E	P
Cokeburg	Washington	500	X	X_p					2/66 E	C
Ellsworth	Washington	700	(1)	X_p					7/66 E	C
Bentleyville	Washington	1,500	(1)	X_p					7/66 E	C
Peters Twp.	Washington	1,000							X	C
Finleyville	Washington	100	X	X_p		X			2/66 E	C
Whitehall	Allegheny	16,000							X_A	C
Bethel	Allegheny	23,600							X	C
Snowden Twp.	Allegheny	2,400							X_A	C

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT YOUGHIOGHENY RIVER)

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Pleasant Hills	Allegheny	8,600							X	C
Jefferson	Allegheny	140							X	I
City of Clairton	Allegheny	18,000		X				X	12/63	I
Penn Twp.	Westmoreland	900*							X	C
City of Jeannette	Westmoreland	13,000							X	C
Manor	Westmoreland	100	X						2/66 E	C
N. Huntingdon Twp.	Westmoreland	2,600			X*				X_B	C
Irwin	Westmoreland	4,270	X						2/66	C
Trafford	Westmoreland	4,300							X_A	C
Export	Westmoreland	760	X						2/66 E	C
Franklin Twp.	Westmoreland	700							X	I
Monroeville	Allegheny	15,500**		X_P			X		X	C
Pitcairn	Allegheny	5,300							X_A	C
Wilmerding	Allegheny	4,300							X_A	C
E. McKeesport	Allegheny	2,700							X_A	C
Plum	Allegheny	5,000							X	C

* Part of sewered area not served by treatment facilities.
** Existing treatment facilities to be abandoned.

TABLE 5
SEWERAGE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER (EXCEPT YOUGHIOGHENY RIVER)

Municipality	County	Sewered Population	Administrative Status			Project Status				Degree of Treatment Provided
			Hearing	Order	Legal Action	Preliminary Plans	Final Plans	Under Construction	Plant in Operation	
Turtle Creek	Allegheny	10,600							X_A	C
Churchill	Allegheny	1,130							X_A	I
N. Versailles Twp.	Allegheny	3,430							X_A	I
Wilkinsburg	Allegheny	29,700							X_A	C
Wilkins Twp.	Allegheny	7,830							X_A	C
Chalfant	Allegheny	1,400							X_A	C
East Pittsburgh	Allegheny	4,120							X_A	C
Edgewood	Allegheny	5,120							X_A	C
Forest Hills	Allegheny	8,800							X_A	C
Swissvale	Allegheny	16,000							X_A	C
Mt. Oliver	Allegheny	5,980							X_A	C
Baldwin	Allegheny	24,000							X_A	C
Baldwin Twp.	Allegheny	2,000							X_A	C

NOTES:

(1) Sanitary Water Board hearing to be scheduled.

X_P Order required plans. All other orders required construction of treatment facilities.

X_A Sewage treated by facilities of another municipality or authority.

X_B . Two or more sewage treatment plants exist. Some of the treatment facilities are owned by the municipality or a local authority and some are owned by another municipality or authority.

Department estimate of date. All other dates taken from schedules submitted by municipalities.

DEGREE OF TREATMENT REQUIRED

C - Complete
I - Intermediate
P - Primary

TABLE 6
INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Warwick Coal Greensboro	Greene	X							X	
Crucible Steel Cumberland Twp.	Greene								X	
Buckeye Coal Co. Cumberland Twp.	Greene	X							X	
Leckrone Coal & Coke German Twp.	Fayette								X	
Jones & Laughlin Steel East Bethlehem Twp.	Washington								X	
Republic Steel East Bethlehem Twp.	Washington								X	
Isabella Coal Luzerne Twp.	Fayette	X							X	
Vesta Coal Luzerne Twp.	Fayette								X	
Penna. Railroad West Brownsville	Washington		X							12/64
Grand View Dairy California	Washington								X	
General Chemical Co. Newell	Fayette	X							X	
Pittsburgh Steel Allenport	Washington	X				X			X*	12/67

* Some facilities now in operation, company proceeding on schedule with construction of remaining needed facilities.

TABLE 6
INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Lee Norse Co. Charleroi	Washington								X	
Corning Glass Charleroi	Washington	X							X	
American Chain & Cable Monessen	Westmoreland	X		1/64					X	
Pittsburgh Steel Co. Monesson	Westmoreland	X				X			X*	12/66
Weiss Packing Donora	Washington								X	
American Steel & Wire Donora	Washington	X		2/64						
Putnack Packing Carroll Twp.	Washington								X	
U. S. Steel - Maple Coal Nottingham Twp.	Washington								X	
Pittsburgh Consolidated Coal Co. Union Twp.	Washington								X	
Duquesne Light Co. Union Twp.	Washington	X							X	
Penna. Railroad Union Twp.	Washington	X								10/64

* Some facilities now in operation, company proceeding on schedule with construction of remaining needed facilities.

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

		Administrative Status				Project Status				
Name and Location	County	Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
West Penn Power Co. Union Twp.	Washington	X							X	
Ligget Spring & Axel Forward Twp.	Allegheny	X							X	
McKesson & Robbins Lincoln Twp.	Allegheny								X	
Penna. Industrial Chemical Jefferson	Allegheny	X				X				12/6
U.S. Steel ByProducts Clairton	Allegheny	X		X		X*			X**	1/66
U.S. Steel Clairton	Allegheny	X							X	
Pa. Industrial Chemical Clairton	Allegheny	X							X	
U. S. Glass Co. Glassport	Allegheny								X	
Southwest Steel Glassport	Allegheny	X							X	
Textron, Inc. Glassport	Allegheny						X			12/64
Copperweld Steel Glassport	Allegheny	X							X	
National Tube Works McKeesport	Allegheny	X				X			X**	3/64

* Consultant studying remaining problem.
** Application made for existing facilities.

TABLE 6
INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
National Tube Cristy McKeesport	Allegheny	X		1/64						
Firth Sterling McKeesport	Allegheny	X							X	
U.S. Steel Duquesne	Allegheny	X		X		X			X*	3/64
Westinghouse Elec. Corp. Wilkins Twp.	Allegheny	X							X	
Westinghouse Elec. Corp. Linhart	Allegheny	X							X	
Trumball Construction West Mifflin	Allegheny						X			1/64
Duquesne Slag West Mifflin	Allegheny	X							X	
U. S. Steel Corp. West Mifflin	Allegheny	X		X		X			X	1/64
Westinghouse Elec. Corp. West Mifflin	Allegheny	X							X	
Bethlehem Steel Co. Rankin	Allegheny	X							X	
Acheson Manufacturing Rankin	Allegheny	X							X	
Mesta Machine West Homestead	Allegheny	X							X	

* Applications made for existing facilities.

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE MONONGAHELA RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
U.S. Steel Corp. Homestead	Allegheny	X		X		X			X*	3/64
B & O Railroad Pittsburgh	Allegheny		X	12/63						
J. K. Davidson Pittsburgh	Allegheny								X	
Republic Steel Pittsburgh	Allegheny	X							X	
A. M. Byers Co. Pittsburgh	Allegheny								X	
Jones & Laughlin Southside Works Pittsburgh	Allegheny	X						X		7/64
Jones & Laughlin Northside Works Pittsburgh	Allegheny	X						X		7/64

* Applications made for existing facilities.

TABLE 6
INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Kaiser Aluminum Stewart Twp.	Fayette								X	
Harbison-Walker Refractories Stewart Twp.	Fayette	X							X	
Eureka Firebrick North Union Twp.	Fayette								X	
Paul Kendi Sons Dunbar Twp.	Fayette								X	
Olin-Matheison Dunbar Twp.	Fayette						X			12/64
G & W Wire Glass Dunbar Twp.	Fayette								X	
Interstate Amesite Dunbar Twp.	Fayette	X							X	
Koppers Co. Dunbar Twp.	Fayette	X							X	
Anchor Hocking Glass South Connellsville	Fayette	X				X		X		4/64
B & O Railroad Connellsville	Fayette	X							X	
Magdovits Packing Connellsville Twp.	Fayette								X	
Jones Brewing Smithton	Westmoreland	X			11/63					

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
MAIN STEM OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Standard Railway Fusee West Newton	Westmoreland	X							X	
Tank Truck Rental North Huntingdon Twp.	Westmoreland								X	
Mason Shaver & Roades North Huntingdon Twp.	Westmoreland	X				X				11/63
Ft. Pitt Steel Co. McKeesport	Allegheny	X		X		X				7/64
Joseph Packing Dunbar Twp.	Fayette								X	

TABLE 6
INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Somerset Limestone Somerset Twp.	Somerset								X	
Alliance Ware Somerset Twp.	Somerset					X				10/63
A. W. Walker Milk Somerset Twp.	Somerset	X							X	
J. & D. Bit Co. Somerset Twp.	Somerset								X	
DeVilbiss Co. Somerset Twp.	Somerset	X							X	
B & O Railroad Somerset Twp.	Somerset								X	
Specht Plastic Somerset Twp.	Somerset								X	
Somerset Canning Somerset Twp.	Somerset	X					X			12/63
A. W. Francis Co. Somerset Twp.	Somerset	X							X	
B & O Railroad Somerset	Somerset								X	
Meadowgold Dairy Brothersvalley Twp.	Somerset	X							X	
Speicher Poultry Rockwood	Somerset	X							X	

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Rockwood Mfg. Rockwood	Somerset	X					X			12/64
Amos J. Yoder Elklick Twp.	Somerset	X							X	
B & O Railroad Confluence	Somerset								X	
Flint Clay Ref. Springfield Twp.	Fayette								X	
Kenallen Coal Mt. Pleasant Twp.	Westmoreland	X							X	
L. E. Smith Glass Mt. Pleasant Twp.	Westmoreland								X	
Will G. Keck Mt. Pleasant Twp.	Westmoreland	X	X	12/63						
F. L. Ferrari Mt. Pleasant Twp.	Westmoreland								X	
Bryce Bros. Mt. Pleasant	Westmoreland	X				X				7/65
Duraloy Co. Scottdale	Westmoreland	X		1/64		X				
Allied Mills Upper Tyrone Twp.	Fayette								X	
Smelko Bros. E. Huntingdon Twp.	Westmoreland	X					X			12/64

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
American Screw & Bolt E. Huntingdon Twp.	Westmoreland	X							X	
Glick Bros. E. Huntingdon Twp.	Westmoreland	X					X			12/64
Bennett's Dairy Unity Twp.	Westmoreland		X			X				12/64
Moyer-Schultz Unity Twp.	Westmoreland								X	
Pleasant Unity Pkg. Unity Twp.	Westmoreland								X	
Walworth S. Greensburg	Westmoreland	X				X	X			11/64
ITE Circuit Breaker S. Greensburg	Westmoreland	X					X			8/63
Pittsburgh Plate Glass S. Greensburg	Westmoreland	X							X	
Ruffsdale Coal E. Huntingdon Twp.	Westmoreland								X	
E. B. Hostoffer E. Huntingdon Twp.	Westmoreland	X					X			12/64
Dillinger Distillery E. Huntingdon Twp.	Westmoreland	X							X	
Miller Rendering Hempfield Twp.	Westmoreland								X	

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE YOUGHIOGHENY RIVER

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Pifferetti Packing Hempfield Twp.	Westmoreland								X	
Robertshaw-Fulton Hempfield Twp.	Westmoreland								X	
Harbaugh Coal Hempfield Twp.	Westmoreland								X	
Castle Provision Hempfield Twp.	Westmoreland								X	
Westinghouse Elec. Corp. Hempfield Twp.	Westmoreland	X							X	
Silvis Farms Hempfield Twp.	Westmoreland	X							X	
Alfery Sausage Hempfield Twp.	Westmoreland	X							X	
Delmont Fuel S. Huntingdon Twp.	Westmoreland								X	
Pittsburgh Coal Sewickley Twp.	Westmoreland								X	
Westinghouse Elec. Corp. Sewickley Twp.	Westmoreland								X	
New Hope Dairy N. Huntingdon Twp.	Westmoreland								X	

TABLE 5

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT TRIBUTARIES OF YOUGHIOGHENY RIVER)

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Shannopin Coal Dunkard Twp.	Greene								X	
Takock Dairy Georges Twp.	Fayette								X	
Ruane Coal & Coke Georges Twp.	Fayette								X	
U.S. Steel - Frostyport Franklin Twp.	Greene								X	
Maiden Mine Monongahela Twp.	Greene								X	
U.S. Steel - Robena Coal Monongahela Twp.	Greene								X	
U.S. Steel Frick Coal & Coke Monongahela Twp.	Greene								X	
Equitable Gas Center Twp.	Greene	X							X	
New York Natural Gas Washington Twp.	Westmoreland								X	
Greenway Manufacturing Franklin Twp.	Greene								X	
Mather Colliery Morgan Twp.	Greene	X							X	
Carnegie Gas Co. Amwell Twp.	Washington								X	

TABLE 6

INDUSTRIAL WASTE STATUS

MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT TRIBUTARIES OF YOUGHIOGHENY RIVER)

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Bethlehem Mines Marianna	Washington								X	
Jones & Laughlin North Bethlehem Twp.	Washington								X	
Gateway Coal Co. Jefferson Twp.	Greene								X	
Acklin Sand Quarry Jefferson Twp.	Greene								X	
Marsilino Stone Quarry North Union Twp.	Fayette								X	
Marsilino Construction North Union Twp.	Fayette	X							X	
Fry Coal & Stone North Union Twp.	Fayette								X	
Marlsbary Manufacturing North Union Twp.	Fayette								X	
Tri-River Fur. West Pike Run Twp.	Washington								X	
Baker's Dairy West Pike Run Twp.	Washington								X	
C. Robison Dairy West Pike Run Twp.	Washington	X							X	
Fava Dairy Somerset Twp.	Washington								X	

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT TRIBUTARIES OF YOUGHIOGHENY RIVER)

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
General Tire & Rubber Jeannette	Westmoreland								X	
Jeannette Glass Bol. Jeannette	Westmoreland	X							X	
Elliott Co. Jeannette	Westmoreland	X							X	
Jeannette Glass Jeannette	Westmoreland	X							X	
Shrum's Dairy Hempfield Twp.	Westmoreland	X							X	
Rathgeb Dairies Hempfield Twp.	Westmoreland	X							X	
Westmoreland Glass Hempfield Twp.	Westmoreland	X							X	
M. Lepidi & Sons Hempfield Twp.	Westmoreland	X							X	
Westinghouse Elec. Corp. Penn Twp.	Westmoreland		X				X			12/64
Mellon Industrial Research Penn Twp.	Westmoreland								X	
Russell Standard Corp. North Huntingdon Twp.	Westmoreland		X	1/64						

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT TRIBUTARIES OF YOUGHIOGHENY RIVER)

		Administrative Status				Project Status				
Name and Location	County	Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
Bethlehem Mines Somerset Twp.	Washington								X	
Marchezak Dairy Somerset Twp.	Washington								X	
Mead Brothers Farm Dairy Somerset Twp.	Washington								X	
Somerset Packing Co. Somerset Twp.	Washington								X	
Hillcrest Dairy Bentleyville	Washington								X	
Bethlehem Mines Ellsworth	Washington								X	
U.S. Steel Spinner Shaft Fallowfield Twp.	Washington								X	
Locust Grove Dairy Fallowfield Twp.	Washington									1/64
Home Dairy Products Fallowfield Twp.	Washington	X							X	
Felix Snyder Snowden Twp.	Allegheny								X	
Fenestra Jefferson	Allegheny								X	
Mississippi Glass Co. Jefferson	Allegheny								X	

TABLE 6

INDUSTRIAL WASTE STATUS
MONONGAHELA RIVER BASIN
TRIBUTARIES OF THE MONONGAHELA RIVER
(EXCEPT TRIBUTARIES OF YOUGHIOGHENY RIVER)

Name and Location	County	Administrative Status				Project Status				
		Order	Violation Notice	Conference	Legal Action	Schedule	Final Plans	Under Construction	Plant in Operation or Discharge Abated	Anticipated Compliance Date
American Bumper North Huntingdon Twp.	Westmoreland		X				X			11/64
Pittsburgh Reflector North Huntingdon Twp.	Westmoreland					X				11/63
Beckwith Machinery Franklin Twp.	Westmoreland								X	
Westinghouse Elec. Corp. Irwin	Westmoreland								X	
Firth Sterling Trafford	Westmoreland			2/64			X			
Westinghouse Elec. Corp. Trafford	Westmoreland	X							X	
Westinghouse Air Brake Wilmerding	Allegheny	X		1/64						
Penna. Railroad Co. Monroeville	Allegheny	X				X				10/63
Eremics Provision Monroeville	Allegheny	X							X	
Union Railroad Monroeville	Allegheny		X	1/64						
Westinghouse Corp. Forest Hills	Allegheny								X	
Westinghouse Elec. Corp. East Pittsburgh	Allegheny	X							X	

TABLE 7
ABANDONED MINES ON THE MONONGAHELA RIVER WATERSHED DISCHARGING MORE THAN 1,000 TONS OF ACID PER YEAR*

Operator	Mine Name	Receiving Stream	Acid Discharge Tons/Year
Pgh. Terminal Coal Co.	#4	Lick Run	1,652
	Davis	Trib. Mon.	7,288
Pgh. Terminal Coal Co.	#7	Beam Run	1,158
	Dougherty	Peters Cr.	1,025
	Gastonville	Peters Cr.	2,449
	Davis	Hayden Run	7,310
	Elizabeth	Turtle Cr.	2,673
Westmoreland Coal Co.	Export #1	Turtle Cr.	8,478
	Delmont #1	Turtle Cr.	14,886
	Export #2	Turtle Cr.	19,639
	Irwin Gas	Turtle Cr.	3,087
	McCullough	Brush Cr.	20,074
	Denmark	Brush Run	3,513
	Edna #2	L. Sewickley Cr.	14,160
	Ocean #2	L. Sewickley Cr.	2,782
	Ocean #1	L. Sewickley Cr.	3,371
	Keystone Shaft	L. Sewickley Cr.	6,574
	Sewickley	L. Sewickley Cr.	1,466
Fred Zeglin	Crows Nest	Jacks Run	39,166

*Information taken from W.P.A. records of work done during the late 1930's.

TABLE 7 (Cont'd.)
ABANDONED MINES ON THE MONONGAHELA RIVER WATERSHED DISCHARGING MORE THAN 1,000 TONS OF ACID PER YEAR

Operator	Mine Name	Receiving Stream	Acid Discharge Tons/Year
	Humphries	Brinker Run	20,442
	Coal Bluff	Monongahela	1,138
	Courtney	Monongahela	2,190
	Daugherty	Froman Run	1,095
Pgh. Coal Co.	Euclid	Youghiogheny	1,036
	Charleroi	Monongahela	1,731
	Port Royal #2	Youghiogheny	1,086
J. & L. Steel Corp.	Vesta #4	Monongahela	3,582
	Griffin #1-2	Cats Cr.	1,536
	Jamison	Coal Lick Run	9,124
	Continental #3	Browns Run	6,546
W. J. Riley	Riley	Georges Cr.	1,301
Green Coal Co.	Gapen #1	Dunkard Cr.	1,944
	Bowood #2	Jacobs Cr.	4,889
	Martin	Monongahela	1,448
	McKeffy	Monongahela	1,171
	Reilly	York Run	1,301
	Outcrop	Georges Cr.	7,809
	Bitner	Bute Run	2,326
U. S. Steel Corp.	Leisenring #1	Opposum Cr.	28,992

TABLE 7 (Cont'd.)
ABANDONED MINES ON THE MONONGAHELA RIVER WATERSHED DISCHARGING MORE THAN 1,000 TONS OF ACID PER YEAR

erator	Mine Name	Receiving Stream	Acid Discharge Tons/Year
	Continental #1	Coal Lick Run	6,546
	Lehigh Air Shaft	Redstone	5,386
Consolidated Coal Co.	#101	Coxes Cr.	1,152
Meager Bros. Coal Co.	- -	Youghiogheny	13,345
Merchants Coal Co.	- -	Youghiogheny	12,088
Chapman Coal Co.	- -	Youghiogheny	2,468
	Tubmill	Youghiogheny	2,482
	Keystone	Youghiogheny	1,878
Louis Testa	Walnut Hill #1	Monongahela	3,623
	Fancy Hill	Cheat River	3,555
		Total	313,961

TABLE 8
ACTIVE MINES IN THE MONONGAHELA RIVER WATERSHED DISCHARGING MORE THAN 300 TONS OF ACID PER YEAR

Applicant	Mine Name	Receiving Stream	Tons/Year
Republic Steel Corp.	Port Royal Mine	Youghiogheny	730
Republic Steel Corp.	Banning Mine	Trib. of Youghiogheny	3,100
Republic Steel Corp.	Euclid	Trib. of Youghiogheny	3,650
*Republic Steel Corp.	Banning No. 3	Trib. of Youghiogheny	300
Republic Steel Corp.	Banning No. 3	Trib. of Youghiogheny	9,200
Leckrone Coal & Coke Co.	Donald No. 4	Monongahela	1,500
Duquesne Light Co.	Alicia No. 2	Whiteley Cr.	5,500
Duquesne Light Co.	Alicia No. 2	Whiteley Cr.	8,500
U. S. Steel Corp.	Leisenring No. 3	Opossum Cr.	6,300
J. & L. Steel Corp.	Shannopin	Dunkard Cr.	1,260
		Total	40,032

*Flow from this borehole is by gravity.

TABLE 9

ACIDITY, ALKALINITY AND HARDNESS*
MONONGAHELA RIVER AT McKEESPORT
(Data from McKeesport Water Works)

PERIOD	METHYL ORANGE ALKALINITY (MG/L)	PHENOLPHTHALEIN ACIDITY (MG/L)	HARDNESS (MG/L)
1911 - 1915	7	10	67
1916 - 1920	2	15	73
1921 - 1925	- 2	16	75
1926 - 1930	- 9	35	111
1931 - 1935	- 11	31	104
1936 - 1940	- 8	34	103
1941 - 1945	- 4	30	106
1946 - 1950	- 2	29	116
1951 - 1955	- 3	28	145
1956 - 1960	- 7	27	133
1961	- 1	14	110
1962	- 7	24	132

TABLE 10

ACIDITY, ALKALINITY AND HARDNESS*
YOUGHIOGHENY RIVER AT McKEESPORT
(Data from McKeesport Water Works)

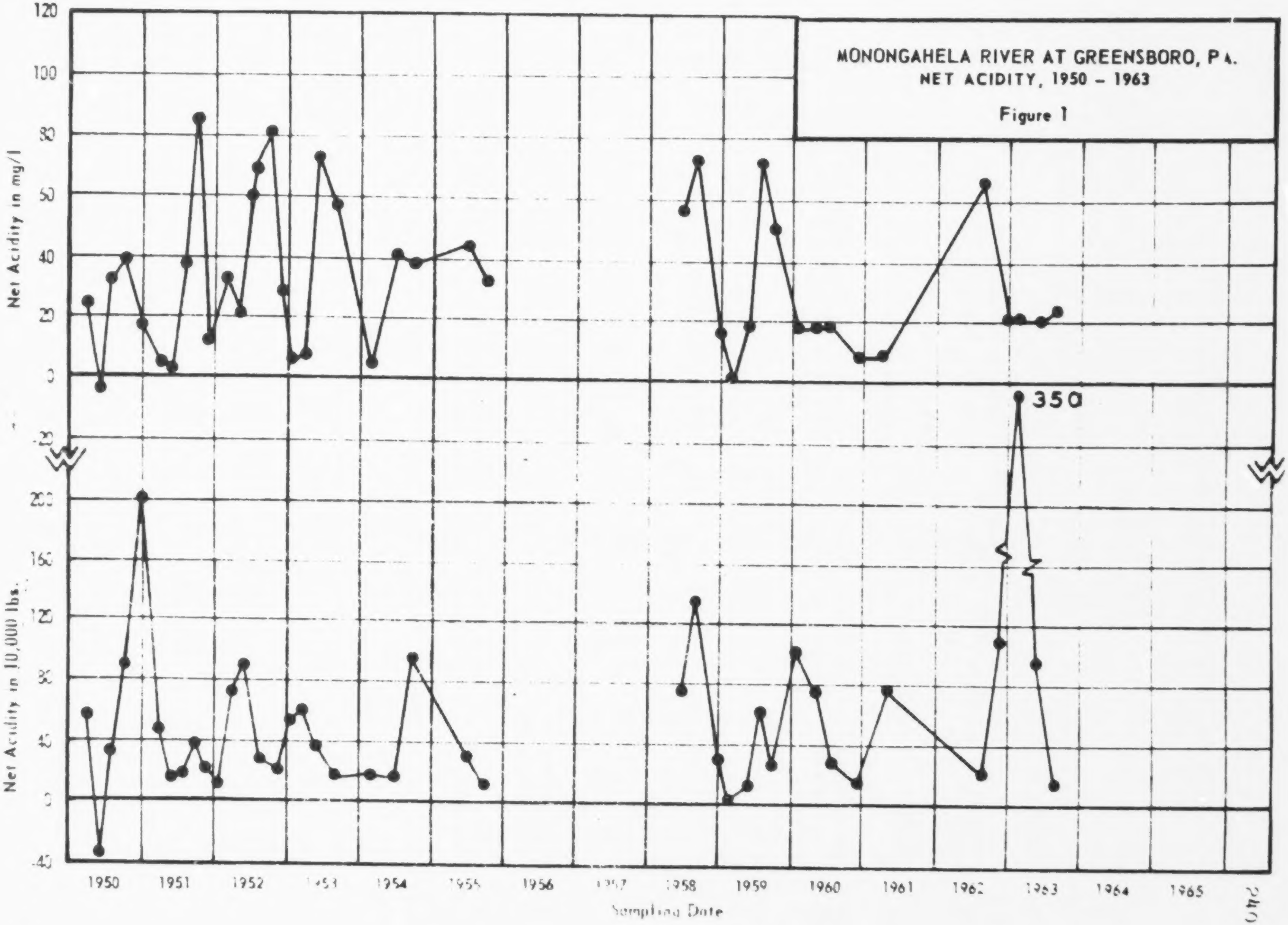
PERIOD	METHYL ORANGE ALKALINITY (MG/L)	PHENOLPHTHALEIN ACIDITY (MG/L)	HARDNESS (MG/L)
1911 - 1915	- 35	81	153
1916 - 1920	- 41	93	176
1921 - 1925	- 43	94	155
1926 - 1930	- 42	92	164
1931 - 1935	- 28	65	147
1936 - 1940	- 23	58	144
1941 - 1945	- 12	43	140
1946 - 1950	- 3	28	108
1951 - 1955	+ 2	16	113
1956 - 1960	+ 1	21	121
1961	+ 4	15	94
1962	+ 1	15	97

* Values are averages of daily analyses of samples collected over the time period indicated.

TABLE 11

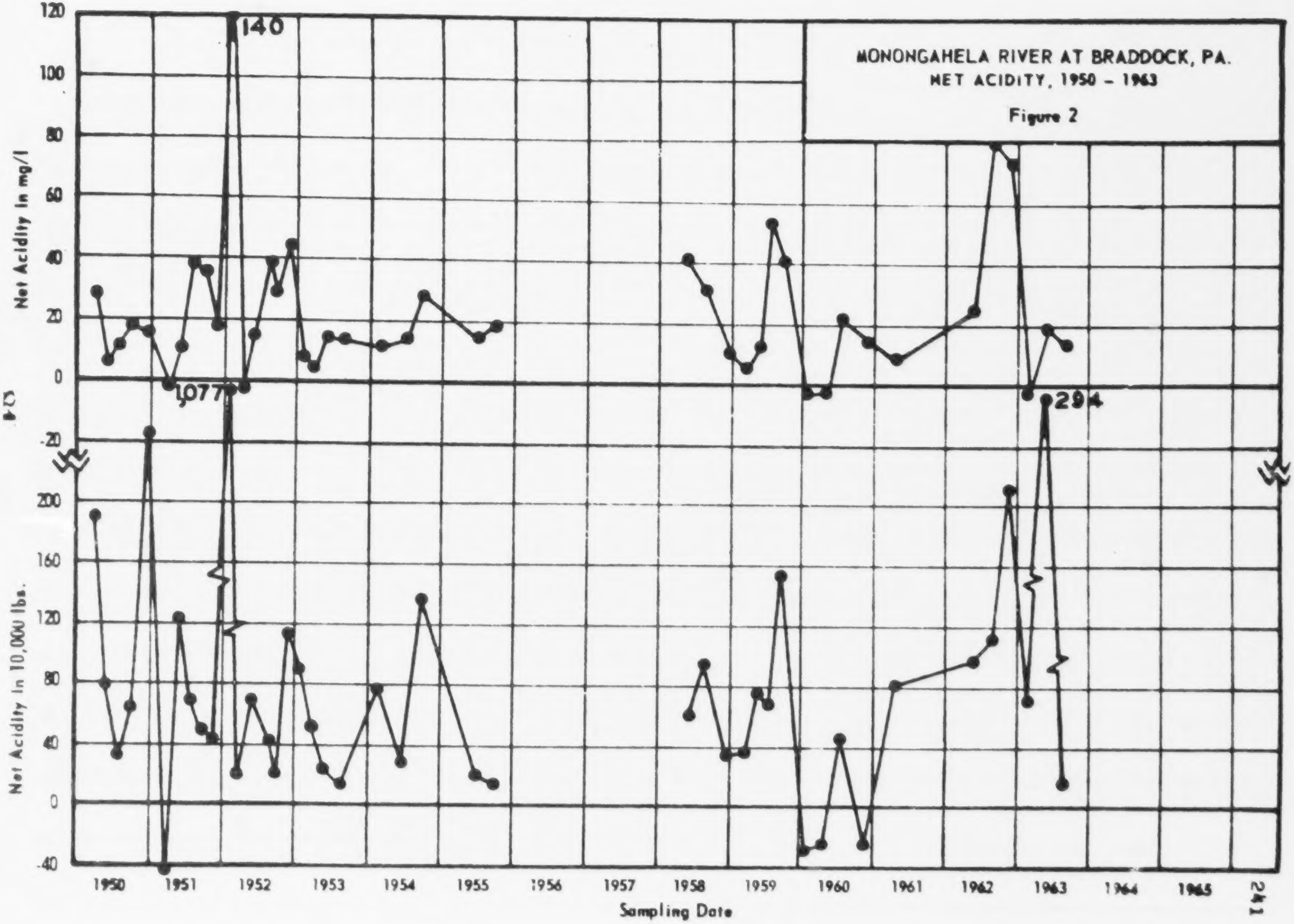
ACID STREAMS IN THE MONONGAHELA RIVER BASIN

NAME	MILES OF ACID STREAM
Monongahela River	92
Streets Run	2
Turtle Creek	11
Brush Creek	10
Brush Run	5
Lyons Run	5
Byers Run	3
Youghiogheny River	20
Sewickley Creek	21
Buffalo Run	5
Wilson Run	3
Jacks Run	3
Brinker Run	2
Cedar Creek	3
Tribs. of Yough. R.	3
Jacobs Creek	14
Hickman Run	1
Galley Run	3
Indian Creek	4
Rasler Run	2
Poplar Run	3
Casselman River	25
Trib. of Casselman R.	3
East Branch	1
Laurel Run	3
Buffalo Creek	7
Millers Run	2
Blue Lick Cr. & Trib.	7
Sub-Total	263
Redstone Creek	23
Coal Lick Run	2
Browns Run	3
North Branch	9
South Branch	1
Cats Creek	4
Georges Creek	10
War Run	2
York Run	10
Tribs. of York Run	5
Muddy Run	4
Tribs. of Muddy Run	4
Cheat River	3
Grassy Run	4
Tributaries	8
Camp Run	2
Peters Creek	5
Lick Run	5
Beam Run	2
Whitley Creek	3
Dunkard Creek	5
Crooked Run	4
Tributaries	1
Sub-Total	119
Total	382



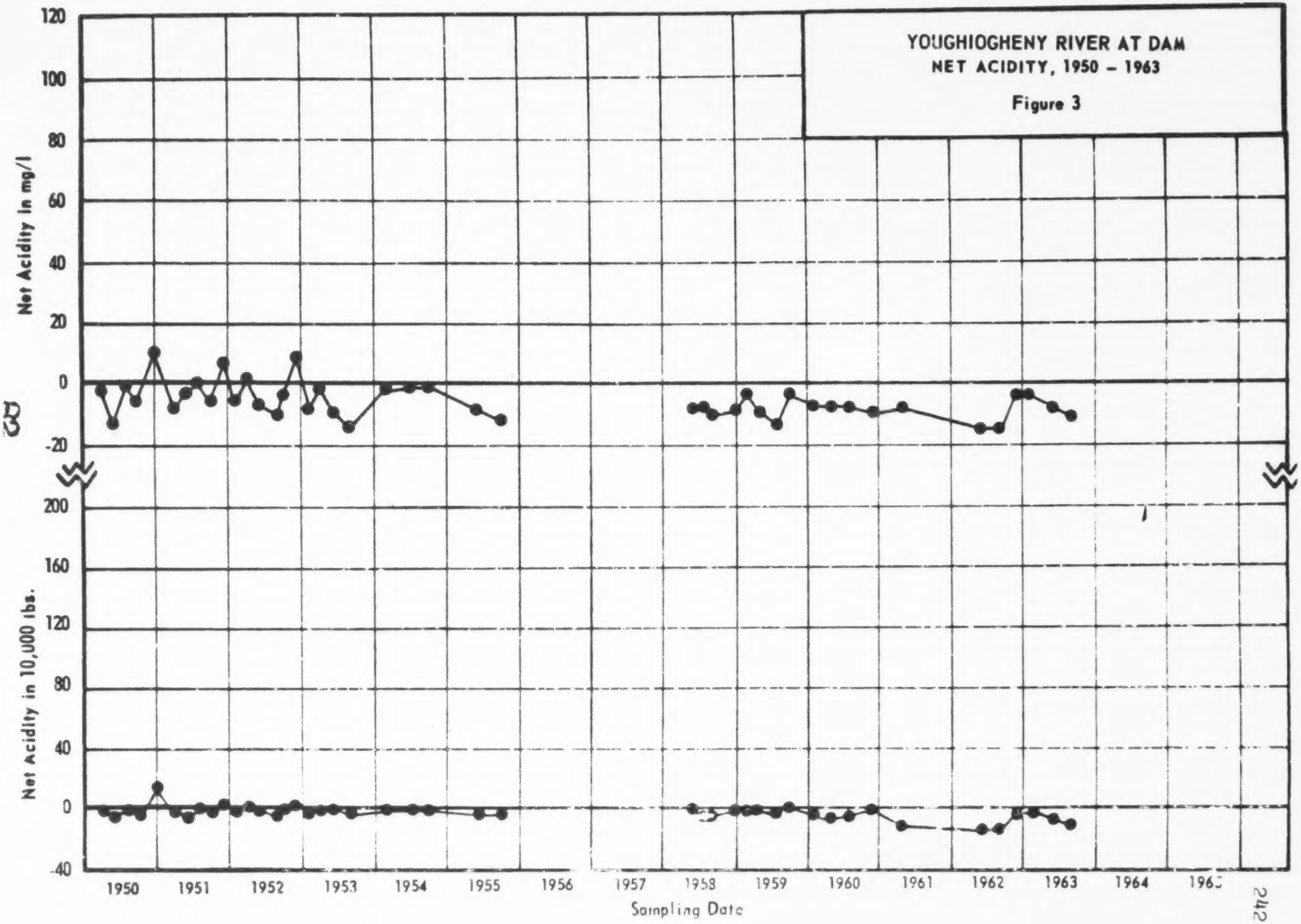
MONONGAHELA RIVER AT GREENSBORO, PA.
NET ACIDITY, 1950 – 1963

Figure 1



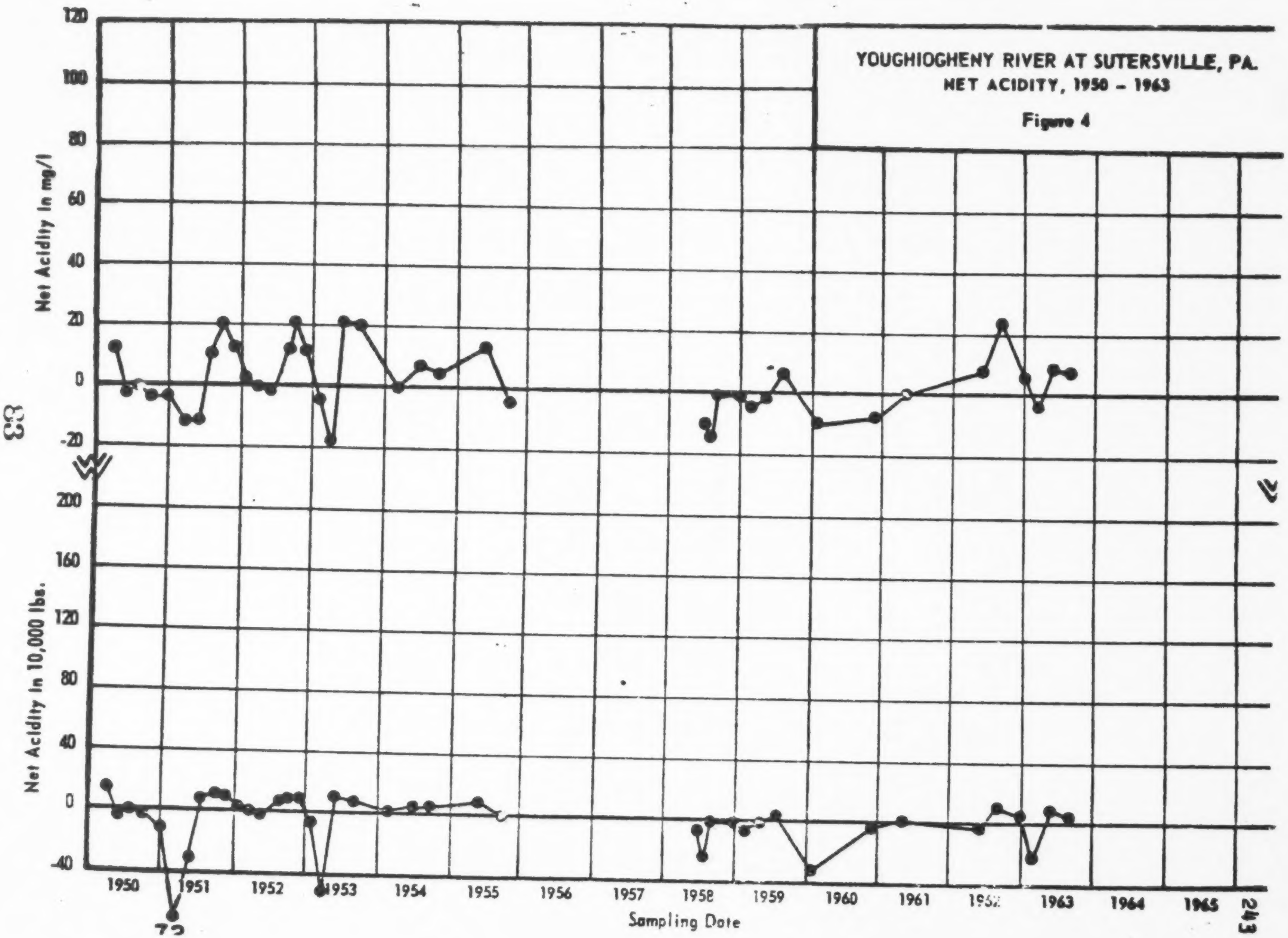
MONONGAHELA RIVER AT BRADDOCK, PA.
NET ACIDITY, 1950 – 1963

Figure 2



YOUGHIOGHENY RIVER AT DAM
NET ACIDITY, 1950 – 1963

Figure 3



YOUGHIOGHENY RIVER AT SUTERSVILLE, PA.
NET ACIDITY, 1950 – 1963

Figure 4

APPENDIX B

ORSANCO Basic Industrial Waste Requirements, IW-1

Industrial wastes shall be treated or otherwise modified prior to discharge so as to maintain the following conditions in the receiving waters:

1. Freedom from anything that will settle to form putrescent or otherwise objectionable sludge deposits which interfere with reasonable water uses.
2. Freedom from floating debris, scum and other floating materials in amounts sufficient to be unsightly or deleterious.
3. Freedom from materials producing color or odor in such degree as to create a nuisance.
4. Freedom from substance in concentrations or combinations which are toxic or harmful to human, animal or aquatic life.

RULES AND REGULATIONS

SANITARY WATER BOARD

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF HEALTH

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 100

Organization and Administration

Article 100—Organization and Administration

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SANITARY WATER BOARD
RULES & REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 100

Organization and Administration

Section 1. General Provisions.

A. The policies and acts of the Board shall be in conformity with the aforesaid laws, and the herein Rules and Regulations shall be interpreted accordingly.

B. The administration of the aforesaid Acts and the Board's Rules and Regulations shall conform to such interstate obligations as the Commonwealth or the Board has assumed or shall in the future assume with respect to other states of the Union, or the Federal Government, or their agents under the interstate agreements or other formal commitments, including those with the Interstate Commission on the Delaware River Basin, the Ohio River Valley Water Sanitation Commission, and the Interstate Commission on the Potomac River Basin, with the signatory states of the Great Lakes Drainage Basin Sanitation Agreement, and the interstate conservation agreements with the Health Departments of the states of New York, West Virginia and Maryland.

C. No act or approval by the Sanitary Water Board shall be construed as an intent upon its part to approve anything inconsistent with law or as abrogating the requirement that the approval of any other municipal, state, or Federal agency shall be obtained (by the party in interest) where such approval is necessary or precedent to the carrying out of anything approved by the Board.

Section 2. Orders and Approvals of Predecessor.

All orders, requirements, approvals, letters of advice, and permits issued by the Board's predecessor, the Commissioner of Health, alone or with the concurrence of the Governor and the Attorney General, shall, where not rendered obsolete by revisions of law, changed conditions, or expiration of time, remain in full force and effect until revoked or modified by the Board after due notice to the party or parties in interest and a hearing thereon.

Section 3. Organization and Procedures.

A. The Secretary of Health, Chairman, when present shall preside at all meetings of the Board. In his absence, he shall designate a member of the Board to serve as Acting Chairman in his stead. In the absence of the Chairman, without such designation, the Board shall designate a member to be Acting Chairman.

B. Four members of the Board shall constitute a quorum.

C. The Division of Sanitary Engineering of the Pennsylvania Department of Health shall be the enforcement agent of the Board.

D. The regular meetings of the Board shall be held on the third Wednesday and Thursday of each month, beginning at 9:00 A.M., in the Board Room, No. 812, Health and Welfare Building, Seventh and Forster Streets, Harrisburg, Pennsylvania, or at such times and places as the Board may designate.

E. Special meetings of the Board may be held at any other time as agreed upon by the Board; at the call of the Chairman; or upon the call for such special meeting by three or more members; at a time designated by the Chairman. The general purpose of the meeting shall be set forth in the notice of such meeting.

Section 4. Rules of Procedure.

Robert's Rules of Order Revised shall be followed insofar as applicable.

Section 5. Recording of Procedures.

The proceedings of formal hearings of the Board and such other proceedings as the Board deems desirable, shall be recorded by a public stenographer or by other means satisfactory to the Board, which services shall be provided by the Secretary of Health.

Section 6. Sessions of the Board.

A. At its meetings the Board will consider and act upon such matters as are submitted to it in the Order of Business for the meeting, together with such other business as the Chairman or the members may submit to it.

B. Upon proper request to it sufficiently in advance, the Board will afford opportunity to an applicant to appear before it, either in person or through a representative authorized to speak for him, to present before the Board matters relating to its orders or to stream pollution.

Section 7. Hearings and Conferences.

A. Insofar as possible, the Board will carry out its orders directly through the personnel of the Division of Sanitary Engineering of the Pennsylvania Department of Health. However, where the Division encounters difficulty in securing the results which the Board deems necessary, or when it deems it otherwise appropriate, the Board will order the party concerned to appear before it for a conference or for a public hearing. At such meetings the party concerned may appear in person, or through duly qualified representatives authorized to speak for him, and may be represented by legal counsel.

B. A hearing will be held for the purpose of providing the evidence upon which the Board will adjudicate a case and issue its order thereon and said hearing will be public; the known parties in interest will be duly notified; those testifying will be sworn; and the general rules of evidence will be observed with, however, the primary purpose being to secure all the pertinent facts in the case. The Chairman will designate the person to conduct the hearing. In general, the legal advisor of the Board will do this on behalf of the Board; a record of the hearing will be made; and an adjudication and an order of the Board will follow.

C. In the case of hearings affecting the general public, public notice of such hearing will be given in the prescribed manner.

D. A conference will be conducted in a manner less formal than a hearing, in general will be in closed session, and will have as its primary object an amicable settlement of the matter at issue.

E. When requested of the Board before the record is transcribed, a copy of the record may be had by any party in interest by paying the cost thereof.

Section 8. Ad Interim Action.

A. Between meetings of the Board the Secretary of Health shall take such ad interim action as the circumstances require, except the granting of permission to discharge untreated sewage, mine drainage, or industrial waste to the waters of the Commonwealth, subject to the ratification, modification, or revocation of such action by the Board at its next meeting, at which time he shall report thereon to the Board.

B. In the case of failure upon the part of the party to comply with the requirements of the Board by a specified date occurring between meetings of the Board, the Secretary of Health may, if he deems there were good and sufficient reasons for such failure, grant a reasonable extension of time within which to meet the Board's requirements, subject to the ratification, modification, or revocation of such extensions of time by the Board at its next meeting.

C. Where protection of the waters of the Commonwealth requires ad interim notice to any party to abate his pollution or to prepare plans for the collection, treatment, or disposal of it, or emergency conditions require the seeking of an injunction or other legal action to stop or prevent pollution of the said waters, the Secretary of Health is specifically authorized to take the appropriate action.

Section 9. Papers of the Board.

Reports and recommendations to the Board by the Division of Sanitary Engineering, records of the Board's secretary, correspondence sent or received by the Division at the direction of the Board, the records of all ad interim actions by the Secretary of Health, and the records of actions taken by the Division of the Board's direction shall be considered "papers of the Board" and shall be open to inspection in accordance with the provisions of Section 607 of the Act of June 22, 1937, P. L. 1987.

SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 200

Division of Sanitary Engineering

Article 200 — Division of Sanitary Engineering

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 200

Division of Sanitary Engineering

Section 1. Scope of Division's Work.

The Division of Sanitary Engineering of the Department of Health shall be the investigating, examining, reporting, and enforcement agent of the Board and shall do such work through its appropriate personnel, subject to the direction of the Secretary of Health, as the Board may from time to time direct, which shall include:

A. The issuance of the Board's notices, orders and other directives.

B. The receipt, examination, study and report upon all applications for permits or other Board approvals of projects or matters relating to the prevention, abatement, or control of stream pollution, the conduct of negotiations necessary for the preparation, correction, revision, and submission of applications, plans and other data relating to such matters, and the preparation of the necessary reports, engineering studies and recommended permits, decrees or refusals, and their submission to the Board through the Secretary of Health for the Board's action thereon.

C. Investigation of complaints of alleged cases of stream pollution, the collection of evidence, and report thereon with recommendations to the Board.

D. Preparation of standards, in cooperation so far as practical with the affected interests, whereby and wherefrom, so far as is reasonably practical and possible, the Board may determine when the discharge of any industrial waste or the effluent therefrom constitutes pollution, and report thereon to the Board with recommendations respecting their adoption and enforcement.

E. Investigation of the character of the various waters of the Commonwealth and the extent of their pollution in order to determine upon the most practical program for the protection or improvement of such waters, and the making of recommendations to the Board concerning placing of such waters or portions thereof in their proper categories in accordance with standards approved by the Board.

F. Investigation and survey of the pollution in various waters of the Commonwealth upon the Division's own initiative or at the direction of the Board, and the carrying out of negotiations for the abatement of the pollution with such parties as are found to be responsible, and to report thereon to the Board from time to time or as required, with recommendations upon such matters in order to protect or upgrade such waters.

G. Investigation, study, evaluation of and report upon means, methods, and processes for the disposal and treatment of wastes to remove or reduce their polluting properties.

H. Reporting upon, with recommendations, all other matters relating to the abatement, prevention, or control of the pollution of the waters of the Commonwealth.

I. Enforcement by the proper processes of such orders of the Board as it may direct the Division to carry out.

J. The Division of Sanitary Engineering shall report and make recommendations directly to the Sanitary Water Board on all matters concerning the work of the Board.

Section 2. Assistance by Division.

A. In order to assist those required to abate their pollution of the waters of the Commonwealth, the staff of the Division of Sanitary Engineering will confer with the representative of such parties, offer their advice and suggestions regarding possible means for the abatement or treatment of the polluting wastes, and interpret the orders of the Board.

B. It has been the uniform experience that a conference between a party required to abate pollution and the staff of the Division of Sanitary Engineering results in a clearer understanding of the matter and expedites a satisfactory solution of the problems involved. A conference between the party's engineers and those of the Division, prior to the preparation of plans, usually saves time and needless work for both sides, and the Board desires that one or more such conferences be held.

C. The Division's staff will not, however, select or recommend the measures or methods to be adopted by the party in meeting the Board's requirements, nor will they act as his consulting engineer. Neither will they recommend the employment of a particular consultant, gather the data for the design of his treatment plant, prepare any plans, or act as an inspector on the construction of the project. Neither will the Board or the Division's staff guarantee directly or by implication the efficacy of the proposed method of pollution abatement. They will exercise their best judgment in assisting from their experience the party and his engineers, but the responsibility for abating his pollution rests entirely upon the one causing the pollution.

Section 3. Issuance of Orders and Compliance.

A. In carrying out its duties of protecting and improving the sanitary quality of the waters of the Commonwealth, the Board will issue orders for the necessary corrective measures to those found to be polluting these waters contrary to law.

B. The general procedure will be to require either the abatement of the pollution or the submission of a report, detailed construction plans, and specifications for the proposed treatment works by a specified date and to require progress reports thereon, usually at monthly or bimonthly intervals as the Board deems appropriate.

C. If in lieu of abatement, the notified party elects to provide waste treatment works and submits plans therefor, the Board, after approving the plans, will set a time within which the treatment works shall be constructed and placed in operation or will notify the permittee to be prepared to construct the plant upon notice from the Board, depending upon the status of the Board's program of construction for the basin in which the receiving stream lies.

D. In general, the Board will require the submission of plans and the construction of plants concurrently for a whole stream basin, but where certain sources of pollution especially affect the public interests, the Board may act to require the abatement of the sources of pollution in the general order of the degree of their adverse effect upon the public interests and available means for reducing their polluting properties, or may apply its requirements to certain reaches of a stream as appears to best serve the public interest. It will be the policy of the Board to require concurrent similar action by all parties in the same category with respect to stream pollution. Each case of pollution is considered by itself, without reference to other alleged or actual polluters.

Section 4. Professional Consultants.

A. Although the proper administration of public funds requires that the services of registered professional engineers engaged to prepare plans and specifications for waste disposal works should be secured at recognized reasonable fees, the selection of professional services upon a purely competitive bid basis is not in accordance with the best practice and may not result in the best quality of service to the municipality selecting its engineers on a purely "low bid" basis. The Board, therefore, recommends that careful consideration be given to the professional attainments of the proposed consultants.

B. Inasmuch as the Commonwealth, through the granting of financial aid to municipalities in the preparation of plans for sewage treatment works, will have a direct interest in the validity of contracts entered into with engineers by municipalities, the Board requires that the contracts for engineering services for the preparation of such plans shall be covered by the proper legal steps so as to insure that these services may be properly paid for after having been rendered, and that the contracts explicitly provide for the services to be rendered, and grant to the municipality the right to receive the reports, plans and specifications and later to construct the treatment works therefrom.

Section 5. Extensions of Time for Compliance.

In some cases, time is required within which to prepare plans and construct treatment works by a party responsible for stream pollution before abatement can be consummated. The Board, upon application by the party and when in its judgment the public interest warrants, may grant a limited extension of time during which the discharge of waste will be permitted, provided the party responsible therefor expeditiously proceeds to provide the required corrective measures.

Section 6. Enforcement by Division of Sanitary Engineering.

A. The inspections, orders, and directives of the Board shall be carried out and enforced by the Division of Sanitary Engineering, under the direction of the Secretary of Health, except in those cases which the Board shall refer to its Legal Advisor.

B. The Division of Sanitary Engineering, in carrying out the orders of the Board, is authorized to issue such subordinate orders or take such steps as are required to effect the progressive accomplishment of the order and which are not inconsistent therewith.

Section 7. Enforcement by Legal Procedure.

Matters referred to its Legal Advisor by the Board or the Secretary of Health, in his capacity as Chairman, shall be handled by him under the general direction of the Attorney General. In case of litigation the Legal Advisor shall represent the Board and take such action as may be approved by the Attorney General acting on behalf of the Commonwealth.

Section 8. Right of Entry.

A. To empower them to enter upon any lands, waters or premises in the state for the purpose of carrying out the Board's work by making surveys, soundings, drillings, and examinations as it deems necessary, the Board, under the statutory authority vested in it, has specifically designated the Division of Sanitary Engineering of the Pennsylvania Department of Health and its employees as its agents, subject to the direction of the Secretary of Health.

B. The Board has also designated the regular Fish Wardens as its deputy field agents to investigate and report to it, through the Executive Director of the Fish Commission, upon all cases of stream pollution referred to them by the Board or its agents for this purpose, and in such other cases of accidental, casual, surreptitious, or other cases of stream pollution occurring in their districts and requiring immediate investigation, and for this purpose has authorized such regular Fish Wardens to enter upon lands, buildings, and premises to properly carry out investigations.

C. Final judgment in each case investigated shall remain entirely and solely within the province of the Sanitary Water Board.

SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 300

Degrees of Treatment

Article 300 — Degrees of Treatment

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 300

Degrees of Treatment

Section 1. Minimum Treatment.

Inasmuch as pollution is not abated nor the waters of the Commonwealth improved by discharging polluting wastes into them, it is the policy of the Board to require that, as a matter of common decency, all wastes discharge to the said waters shall be given a minimum degree of treatment equivalent to the "primary" treatment of sewage.

Section 2. Primary Treatment.

"Primary" treatment of sewage is such treatment as, in the opinion of the Board, will remove practically all the settleable solids; will remove at least thirty-five (35) percent of the organic pollution load as measured by the biochemical oxygen demand test; will provide effective disinfection to control disease-producing germs; will provide satisfactory disposal of sludge; and will produce a final effluent that is suitable for discharge into the receiving stream.

Section 3. Complete Treatment.

In order to protect the waters of the Commonwealth, it is the policy of the Board to require that wastes be given treatment equivalent to the "complete" treatment of sewage before discharge thereto, when, in the opinion of the Board:

A. The waters, or the portion thereof to which discharge is to be made, are substantially clean waters of the Commonwealth or are to be made such; or

B. The critical low flows of said waters are such as to require such treatment; or

C. The pollutional strength of the wastes is so high that such treatment is necessary to sufficiently reduce the residual wastes to afford proper protection to the said waters; or

D. The use of the waters for public water supply or for other superior purposes makes such treatment necessary.

"Complete" treatment of sewage is such treatment as, in the opinion of the Board, will remove practically all of the suspended solids; will remove at least eighty-five (85) percent of the organic pollution load as measured by the biochemical oxygen demand test; will provide effective disinfection to control disease-producing germs; will provide satisfactory disposal of sludge; and will produce a final effluent that is suitable for discharge into the receiving stream.

Section 4. Intermediate Treatment.

For those waters of the Commonwealth which are intermediate between the two foregoing categories, the Board requires that wastes to be discharged thereto shall first be given the equivalent of an "intermediate" treatment of sewage, the degree of which shall be fixed by the Board in accordance with the conditions pertaining to each specific case.

Section 5. Additional Requirements.

A. It is further required that the aforesaid degrees of treatment shall include the removal of oils, greases, acids, alkalis, toxic, putrescible, taste-and odor-producing substances, and other substances inimical to the public interest in the receiving stream.

B. The limited residual amounts of such substances which will be permitted shall be those specified in the standards adopted by the Board, as hereinafter set forth, or as the Board shall otherwise determine for the particular reach of the stream involved.

C. Furthermore, in the case of those wastes whose original pollutional content is so great in absolute amount that the residual remaining, after the equivalent of the specified degree of treatment of sewage, would be too great for the proper protection of the receiving waters, the Board will specify what further removal of their polluting properties is necessary or will prohibit the discharge of such wastes, as the circumstances require.

D. With respect to industrial wastes, the same general requirements will apply as specified for sewage in Sections 2, 3 and 4, and proportionately the same requirements for reductions in polluting characteristics set forth for the treatment of sewage in the above mentioned sections will apply also to reductions from the raw waste characteristics of industrial wastes as these have been or may be determined by the Sanitary Water Board from time to time, except in the cases of oil, greases, phenolic substances, certain metals, toxic and other materials, including radio-active substances. Minute quantities of most of these materials are objectionable or dangerous, and the requirements for each are set forth specifically in these Rules and Regulations, or will be published as the need arises or as knowledge permits.

Section 6. Schuylkill River Requirements.

In the case of the Schuylkill River, because of the extensive use of the waters of this stream for public water supplies and other essential purposes; and in consideration of the appropriations by the General Assembly to defray the cost of the Commonwealth's part in removing silt from the river, the Board has declared that the discharge of untreated sewage and industrial wastes into any part of the Schuylkill River and its tributaries does or would, in fact, create a condition inimical to the public interest. The Board, therefore, requires that sewage and industrial wastes shall be given a minimum of primary treatment before being discharged to the Schuylkill River or its tributaries above Reading, Pennsylvania, and shall be given complete treatment before discharge to the river and its tributaries at or downstream from Reading.

Section 7. Stream Classification of Acid Waters—Sewage

The following general criteria shall be applied when considering the classification of streams and the degree of treatment required for sewage discharged to acid waters

A. *Definitions:*

1. *Acid Stream*—
   A stream or sector thereof is acid in character when it contains mineral acids and/or acid salts from coal mines to the extent that the total acidity determined by the hot method, using phenolphthalein indicator, exceeds the total alkalinity determined to the bromphenol blue end point at pH 4.0.
2. *Stream "Impregnated" with Acid*—
   The term "impregnated with acid coal mine drainings" within the meaning of Act 394, approved June 22, 1937, as amended, is interpreted as applying to a stream saturated with acid coal mine drainage to the point that all the alkalinity of the stream has been exhausted. A stream or sector thereof will be considered to be impregnated with acid coal mine drainage when the waters thereof are generally mixed to the degree that they have a pH value of 4.0 or less at practically all times and throughout the stream.
3. *Discharges of Sewage Inimical to the Public Interest*—
   Discharges of untreated sewage into waters impregnated with acid coal mine drainage shall be considered inimical to the public interest under the following conditions:
   a. When the stream is unable to inoffensively assimilate the discharge.
   b. When such discharge of untreated sewage is or may make inimical or injurious the uses of the stream as a source of water supply for public, domestic, industrial or recreational purposes, or where such discharge adversely affects public health, animal or aquatic life.
   c. When special conditions arise; e.g., the erection of a flood control dam or diversion of river water to a canal above the point of discharge, thus reducing stream flow, or removal of water from streams by farmers or for irrigation, especially in drought times.

B. *Classification:*

1. *Acid Stream—Not Impregnated*—
   In cases where streams are acid but not impregnated with acid, the ordinary procedures for determining the degree of treatment for alkaline waters shall be used. Such streams may be classified at a lower degree of treatment than would be used for waters which have no acid mine drainage contained therein, unless such

lower degree is inimical to the public interest as defined above.

2. *Stream Impregnated with Acid—*
   a. When the stream is impregnated with acid coal mine drainage and when no condition is created inimical to the public interest, no treatment of sewage shall be required.
   b. When the stream is impregnated with acid coal drainage, but when a condition may be created which is inimical to the public interest as defined above, some degree of treatment for sewage shall be required. The degree of treatment shall be determined in accordance with (a) volume of water and character of the stream, (b) the strength and volume of the discharge, and (c) the uses to which the stream is or may be put.

SANITARY WATER BOARD
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Article 400

Applications and Permits

Article 400 - Applications and Permits

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 400

Applications and Permits

Section 1. Applications.

A. Applications for approval of projects by the Board shall be made upon the appropriate form, to be supplied upon request by the Division of Sanitary Engineering without charge. Applications from all parties, except agencies of the Federal Government or the Commonwealth of Pennsylvania, must be accompanied by a check for Twenty-five Dollars ($25.00) made out to "Commonwealth of Pennsylvania, Department of Health." The application must be in triplicate, one copy which must be attested by a Notary Public, Justice of the Peace, or Alderman, and must be accompanied in triplicate by an engineer's report, plans and specifications in sufficient detail to show clearly what is proposed and to permit the bases of design to be thoroughly understood and checked. The plans, report, and specifications must be prepared by a licensed professional engineer authorized to practice in Pennsylvania. EXCEPTION: Mine Drainage. The front cover or fly leaf of each set of drawings and each copy of the report and specifications must bear the imprint of his seal and, in addition, each drawing submitted must bear an imprint or legible facsimile of his seal; except that reports, drawings, and specifications for minor work not involving safety to life or health may be submitted, as provided by law, by a Registered Surveyor and, when submitted, shall bear the imprint or facsimile of the seal as prescribed in the preceding clause.

B. The application and its accompanying papers shall be submitted to the Board through the Regional Engineer of the Pennsylvania Department of Health in whose Region the project will be located.

Section 2. Bases of Design for Projects.

The Board requires that the plans provide ample capacities for present needs and for a reasonable time in the future, and that conservative and accepted factors of design be used. Where the suitability of a proposed device or method of treatment has not been demonstrated by actual field use, only conditional approval will be given to it until such time as the effectiveness of the device or treatment has been demonstrated to the satisfaction of the Board by ample field experience.

Section 3. Comprehensive Plans.

Inasmuch as the proper and economical collection and treatment of wastes requires preparation of a comprehensive and well conceived plan which provides for such service and for the future extension to serve areas which may be expected will be connected to the existing facilities, the Board desires that all municipalities having sewers, and those communities which need sewerage facilities, prepare and submit to it for approval such a comprehensive plan. To this end the Board, in general, will not approve sewerage extensions for a muncipality in those cases where a prior permit's condition, requiring the submission of such a plan, has not been fulfilled.

Section 4. Applications for Private Projects.

The Board will look with disfavor upon applications from "persons" for sewerage permits for private sewerage projects to be located within the built-up parts of cities, boroughs, first and second class townships and, in general, will limit issuance of sewerage permits to "persons" to proper private sewerage projects located in the rural parts of first and second class townships, and for which areas there appears to be no present necessity for public sewerage.

Section 5. Applications Involving Non-Compliance.

A. In considering applications coming before it, the Board will take cognizance of the failure of the applicant to comply with any of its prior requirements or orders, respecting sewerage or industrial waste disposal or waste disposal related to the application under consideration, and will only favorably consider the proposed project if, in its opinion, there are sufficient extenuating reasons for such failure or if the public interest as affected by the proposed project warrants favorable action, in which case the Board will include in any permit which it may authorize, suitable conditions respecting compliance with its unfulfilled requirements.

B. The Board will not consider an application or issue a permit to an applicant who has conducted or is conducting a mining operation which is in violation of law and/or Rules and Regulations of the Sanitary Water Board and/or permit conditions unless and until said violation is abated or corrected to the satisfaction of the Board.

SANITARY WATER BOARD
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Article 500

Federal Grants

Article 500 — Federal Grants

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 500

Federal Grants

Section 1. Filing of Applications, Reports, Plans and Specifications

Approval by the Sanitary Water Board of applications for a Federal grant under Section 6 of the Federal Water Pollution Control Act shall be given only for those projects for which an application for such a grant and the final report, plans and specifications have been received by March 1 prior to the beginning of the Federal Fiscal Year, and the final report, plans and specifications have been approved and a permit therefor has been authorized by the Sanitary Water Board prior to the beginning of the Federal Fiscal Year.

Section 2. Eligible Projects.

Projects approved for a grant by the Sanitary Water Board shall be known as eligible projects and the Board shall determine the total relative needs for each such project, in accordance with Sections 5 through 9, below.

Section 3. Certification for a Priority.

Those eligible projects having the highest total relative needs shall be certified for priorities, PROVIDED, HOWEVER, that to be certified for a priority, an applicant must be qualified for certification under the provisions of Section 4 below.

Section 4. Qualification of Applicants for Certification.

To be qualified for certification over an applicant of another eligible project, the first applicant may not have been certified for a priority, in a previous Fiscal Year, over the other applicant unless the other applicant has since had a project certified for a priority or unless the first applicant was unable to receive a grant because of circumstances beyond its control and for reasons which it could not have reasonably been expected to foresee.

Section 5. Total Relative Needs.

The total relative needs of each applicant shall be the sum of his relative needs as determined below for Water Pollution Control, Per Capita Cost and Financial Need.

Section 6. Relative Needs.

Applicants' relative needs shall be established according to their relative number of points, the applicant with the lowest number of points having zero relative need and the applicant with the highest number of points having the following relative need:

Water Pollution Control	50
Per Capita Cost	10
Financial Need	40

Section 7. Water Pollution Control.

A. The number of points for Water Pollution Control shall be determined as follows:

Detrimental Effect of Pollution	Points Based on Degree of Effect: Slight or No Effect	Moderate Effect	Great Effect
(1) On public water supply	10	20	30
(2) On recreation and aquatic life	8	17	25
(3) On industrial water supply	5	10	15
(4) On agriculture	2	3	5
(5) Causing nuisance effects other than above	3	7	10
Equivalent Design Population	0 to 15 points		

B. The degree of detrimental effect of the pollution shall be established on the basis of the existing or immediately foreseeable detrimental effect on waters of the Commonwealth of pollution which will be prevented by the proposed project.

Section 8. Per Capita Cost.

The number of points for Per Capita Cost shall be determined by dividing the estimated cost allowable by the design equivalent population. Estimated cost allowable shall be the minimum reasonable cost necessary to provide the essential facilities of the sewage works project.

Section 9. Financial Need.

The number of points for Financial Need shall be determined by the relative total taxes collected per $10,000 market value of taxable real property.

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Article 600

Industrial Wastes

Article 600 Industrial Wastes

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 600

Industrial Wastes

Section 1. Degrees of Treatment Required.

In issuing its orders for abatement of the discharge of polluting wastes to the waters of the Commonwealth or for their proper treatment, the Board will set forth the degree of treatment required in terms of the treatment of sewage and will specify that in the case of industrial wastes they shall be given equivalent treatment. The tests to be applied to such wastes shall be those appropriate to the particular type of waste under consideration and which shall be suitable for determining equivalency. As the equivalency of various industrial wastes is determined, from time to time, by the Board, this information will be made available to the public in the form of standards promulgated by the Board for such industrial wastes.

Section 2. General Standards.

A. In order to specify the required reduction in pollution load of wastes from various sources, the Board has adopted certain values as representing the "normal raw waste characteristics" from various manufacturing processes. Except where, in the opinion of the Board, special conditions require some modification of these, the reduction in pollution load required will be computed from such standards as have been adopted and are applicable.

B. In other cases the Board has adopted standards with respect to the characteristics of the effluent discharged to the receiving stream or as to the amount, rate, or manner in which such wastes may be discharged. These standards will be revised when, in the opinion of the Board, changed conditions or increased knowledge warrant such revision.

C. The characteristics of the waste waters from an industrial establishment to be used in determining compliance with standards established by the Board for "normal" raw wastes and final effluent shall be those due to changes or additions resulting from the use of the water by the industry.

D. The Board considers that the pollution load of wastes should be reduced to the maximum extent practical by process changes, segregation of strong wastes, reduction in volume and re-use of water, and by general measures of "good housekeeping" within the plant. Furthermore, the Board does not consider that "practical" measures are limited to those which are profitable.

Section 3. Milk Processing Wastes.

A. In those cases in which the Board requires the primary treatment of milk plant waste waters, the final plant effluent shall not contain more than sixty-five (65) percent of the biochemical oxygen demand (BOD) per 10,000 pounds of milk intake set forth below. Where the Board requires complete treatment, the effluent shall not contain more than fifteen (15) percent of these BOD values, and where intermediate treatment is required by the Board, it will set forth for each case the required percentage of the following amounts of BOD which the effluent may contain.

	Lbs. BOD per 10,000 lbs. of milk or milk equivalent for 1st 50,000 lbs. of milk handled	for each 10,000 lbs. over 50,000 lbs. handled
Process		
Receiving and cooling milk including can washing	7	6
Can washing	4	4

	Lbs. BOD per 10,000 lbs. of milk or milk equivalent for 1st 50,000 lbs. of milk handled	for each 10,000 lbs. over 50,000 lbs. handled
Tank truck delivery to or from plant	1	1
Storing in tanks	1	1
Evaporating whole milk, plain, floor waste	4	3
Evaporating whole milk, plain, entrainment loss	2	2
Evaporating whole milk, sweetened, floor waste	6	5
Evaporating whole milk, sweetened entrainment loss	2	2
Canning and sterilizing evaporated milk	4	3
Spray drying	4	2
Cream separating	4	4
Cream pasteurization, cooling and can filling	4	4
Cottage cheese making (also casein)	16	16
American cheese making, unwashed curd	10	8
American cheese making, washed curd	16	14
Skim condensing, plain, floor waste	6	6
Skim condensing, plain entrainment loss	3	3
Skim condensing, sweetened, floor waste	8	8
Skim condensing, sweetened, entrainment loss	3	3
Skim condensing, superheated	12	12
Skim drying, roll	20	10
Skim drying, spray	4	2
Whey condensing, sweet, entrainment loss	4	4
Whey condensing, sweet, floor waste	16	8
Whey condensing, acid, floor waste	12	8
Whey condensing, acid entrainment loss	3	3
Whey drying	10	6
Buttermilk condensing	12	8
Milk pasteurization, cooling and bottling	10	8
Ice cream mix making, pan	8	6
Ice cream freezing	2	2
Cultured buttermilk making	10	10
Butter churning and washing	6	6
Ice cream mix making, vat	8	6

B. The milk intake to be used for the foregoing purpose shall be that amount of milk which represents the average daily processing load for the three consecutive days during the last representative year which gave the highest average daily milk volume processed, adjusted to include the capacity of any processing equipment not in use but available for use and for any change in the operation policy of the plant involving a greater or lesser intake of milk or change in processing.

C. Further, in order to facilitate the attaining of the foregoing requirements, the Board endorses means of minimizing the loss of milk solids, or their equivalent, including:

1. Effective draining of milk cans ahead of the can washer and disposal of the drips without discharge to the waste waters.
2. Standard practice of rinsing all equipment with a small amount of water or atomizing spray after use and before cleaning, and the disposal of these rinsings without discharge to the waste waters.
3. Automatic liquid level controls or alarms at all points in the plant where there is danger of accidental overflow.

4. Provisions for preventing foaming, especially from old-fashioned separators.
5. Automatic temperature control or alarms on hot wells to prevent boiling over.
6. Properly maintained automatic temperature controls or alarms on coolers to prevent freezing on of milk solids.
7. Adequate storage capacity, equipment, and personnel to handle the maximum flush volume of milk intake without excessive crowding of plant equipment or personnel.
8. Adequate provisions for handling all milk and dairy products in case of plant breakdown or power failure.
9. Provision for good preventive maintenance of all equipment, including sanitary fittings, valves, pumps, separators, etc., to avoid leaks.
10. Receptacles available for use for the reception of drips and leaks in case these should occur during the run in spite of good preventive maintenance.
11. Adequate facilities for collecting, storing and utilizing buttermilk, whey or other concentrated by-products, so that at no time will any of these be disposed of with the waste waters.

D. In the case of small milk plants handling not over 20,000 pounds of milk per day, the Board will, if in its opinion conditions warrant it, permit the amount of BOD allowable under the foregoing table to be increased in portion to the ratio of the full day to the working day of the plant when the equivalent of an approved holding tank having an effective volume of approximately one and a half times that of the waste waters from the milk intake set forth in the foregoing paragraph, is provided and is equipped with approved aerating and measuring devices and means for distributing the discharge of the wastes uniformly over the twenty-four (24) hours of the day.

E. The Board cautions against the discharge of milk, by-products, or spoiled products and of the necessity of providing adequate means for the proper disposal of such wastes in case of equipment breakdown, power failure, or other contingencies, and calls the attention of the milk industry to the penalties for pollution resulting from such discharges.

Section 4. Colliery Silt.

A. All coal washeries to be constructed in the Commonwealth of Pennsylvania, whether proposed to be a closed system or not, shall be required to submit an application and plans and secure a permit from the Sanitary Water Board prior to placing the facilities in operation.

B. All waters containing silt or coal mine solids discharged, pumped, or flowing from coal mines, coal handling, processing, preparing or washing plants, or from other colliery operations, shall, before discharge to the waters of the Commonwealth, be so treated as to remove substantially all of their settleable solids; meaning thereby, such removal as can be accomplished by efficient quiescent sedimentation of at least one hour's duration under laboratory conditions, shall not contain more than 1,000 ppm of suspended solids, and shall be given such further treatment in special cases as, in the opinion of the Board, conditions shall make necessary.

Section 5. Acid Pickling Waste Waters.

A. In those cases for which the Board requires the PRIMARY TREATMENT of sewage and industrial wastes:

1. All spent acid pickling liquors (as distinguished from acid rinse waters) shall be treated by neutralization, aeration, settling, or by such other means as the permittee may elect, to remove completely the free and combined acids and iron compounds therein.
2. For any monthly period the entire discharge to the waters of the Commonwealth from a metallurgical plant, including rinse waters, unaccounted for losses; the spent acid pickling liquors after effective treatment as described under Paragraph (1), plus any other treatment plant effluents, shall have a total free and combined acid content, computed as 100% sulphuric acid, which shall not exceed 500 pounds per 2000-pound ton of total acid, computed as 100% sulphuric acid, consumed during such period.
3. The total iron content of all the plant's waste waters during the same period shall not exceed 225 pounds per ton of the total acid consumed.
4. The rate of discharge of the permissible amounts of acids and iron carried in the plant wastes from day to day shall as far as practicable be kept uniform.

B. In those cases in which the Board requires the COMPLETE TREATMENT of sewage and industrial wastes, the requirements concerning acid pickling liquor losses set forth under Paragraph A shall apply, except that the total acid and iron losses shall not exceed fifteen (15) percent of the amounts specified in Paragraph A (2) and Paragraph A (3) respectively.

C. In those cases in which the Board requires an INTERMEDIATE DEGREE OF TREATMENT of sewage and industrial wastes, and in those cases in which because of the effect upon a public water supply or other use or condition of the receiving stream, the aforesaid standards are not appropriate, the Board will set requirements appropriate to each such case and condition.

D. In the case of metallurgical plants constructed or reconstructed subsequent to March 1, 1950, the Board will establish requirements concerning acid and iron losses in the mill waste waters consistent with the protection of the receiving stream by requiring lower amounts of pickling liquor losses made reasonably attainable through modern plant design.

Section 6. Pulp, Paper and Paperboard Wastes.

A. The characteristics set forth below shall be considered to be those of the standard raw wastes from the manufacture of pulp, paper, paperboard, and similar products and shall represent the average values for any three consecutive working days and for any single eight-hour period, respectively, as determined by the analyses of samples collected (at intervals not exceeding twenty minutes) during at least eight consecutive hours on each of three days, composited, and analyzed according to the methods specified by the Division of Sanitary Engineering of the Pennsylvania Department of Health.

B. In those cases in which the Board requires the PRIMARY TREATMENT of sewage and industrial wastes, the setteable solids in the plant effluent as discharged to the waters of the Commonwealth shall not exceed 2%; the suspended solids shall not exceed 30%; and the population equivalent shall not excedd 65% of the standard characteristics aforesaid.

C. In those cases in which the Board requires the COMPLETE TREATMENT of sewage and industrial wastes, there shall be practically complete removal of settleable solids, and the suspended solids shall not exceed 10%, nor the population equivalent 15% of the aforesaid standard characteristics.

D. In those cases in which the Board requires an INTERMEDIATE DEGREE OF TREATMENT of sewage and industrial wastes, and in those cases in which because of the effect upon a public water supply or other use or condition of the receiving stream the aforesaid standards are not appropriate, the Board will set requirements appropriate to each such case and condition.

E. In the case of pulp and paper mills constructed or reconstructed subsequent to July 15, 1950, the

Type of Product or Process	Population Equivalent Per Ton of Product Based on 5-Day BOD		Pounds of Suspended Solids Per Ton of Product	
	Avg. of 3 consecutive operating days	Avg. of 8 consecutive operating hours	Avg. of 3 consecutive operating days	Avg. of 8 consecutive operating hours
(1) GROUP A—TISSUE, GLASSINE, PARCHMENT, CONDENSER, ETC.				
Sub-group "Aa": Tissue Paper	75	80	40	50
Sub-group "Ab": Glassine Paper	25	30	15	20
Sub-group "Ac": Parchment Paper	40	45	20	30
Sub-group "Ad": Miscellaneous Papers	25	30	5	10
Sub-group "Ae": Flax Papers-Condenser	375	415	300	350

Type of Product or Process	Population Equivalent Per Ton of Product Based on 5-Day BOD		Pounds of Suspended Solids Per Ton of Product	
	Avg. of 3 consecutive operating days	Avg. of 8 consecutive operating hours	Avg. of 3 consecutive operating days	Avg. of 8 consecutive operating hours
(2) GROUP B—SPECIALITY GROUP —FIBRE, ASBESTOS, INSULATING, ETC.				
Sub-group "Ba": Fibre Paper	800	850	200	235
Sub-group "Bb": Asbestos Paper	125	185	290	350
Sub-group "Bc": Felt Paper	210	230	60	65
Sub-group "Bd": Insulating Paper	2250	2500	325	350
Sub-Group "Be": Speciality Papers	1000	1200	135	160
(3) GROUP C—COARSEPAPER	90	120	35	50
(4) GROUP D—INTEGRATED MILLS				
Sub-group "Da": Wood Preparation	80	100	40	50
Sub-group "Db": Pulp-Sulfite	3000	3500	35	40
Sub-group "Db": Pulp-Alkaline	300	350	20	35
Sub-group "Db": Pulp-Groundwood	115	130	80	85
Sub-group "Db": Pulp-De-inked (unfilled stock)	500	650	375	500
Sub-group "Db": Pulp-De-inked (filled stock)	400	500	600	800
Sub-group "Db": Pulp-Rag cooking	1400	1550	475	500
Sub-group "Dca": Bleaching (1) Long Fibre Stock-Multi or Single Stage Bleached and (2) Short Fibre Stock-Single Stage Bleached	60	70	3	6
Sub-group "Dcb": Bleaching Short Fibre Stock-Multi Stage Bleached	165	185	30	35
Sub-group "Dd": Paper Making	100	125	75	85

Board will establish requirements concerning "normal raw wastes" of the mill's waste water consistent with the type of mill and the protection of the receiving stream.

Section 7. Oil and Natural Gas Well Wastes.

A. A sump shall be provided for each well drilling operation, such sump to be large enough to receive without overflow all drill cuttings, water and oil that may be produced in the drillings and cleaning out of the well. Surface water shall be excluded from such sumps by means of diversion ditches on the uphill sides, or by other appropriate measures. After completion of the well, any oil and basic sediment (B.S.) that has accumulated shall be burned or disposed of in such a manner as to avoid a fire hazard. Proper measures shall be taken to prevent sump contents from being washed into streams.

B. In case such abnormally large quantities of water are encountered in drilling as to exceed the capacity of the sump, the sump shall be provided with a suitable overflow device and the water shall be discharged to the sump at such rates and in such manner that any overflow from the sump will be free of settleable solids and substantially free of turbidity.

C. Where the location of a well precludes or makes unnecessary the use of a sump, equivalent measures shall be taken to prevent the pollution of the waters of the Commonwealth.

D. If large volumes of oil are encountered in shooting a well, a dome shall be placed over the well or other suitable measures taken to prevent the discharge of any oil to the waters of the Commonwealth. These wastes shall not be dumped or drained upon the surface of the ground in such a manner that they may flow or be washed into the waters of the Commonwealth.

E. For all producing wells, adequate provision shall be made to receive all salt water, oil, and basic sediment (B.S.) in tub tanks or suitable containers from which all such wastes, tank bottoms, and other petroleum residues shall be discharged into one or more sumps of adequate size, or into equivalent settling devices, equipped with baffles, siphons, or other suitable means to prevent all oil and residues from reaching the waters of the Commonwealth.

F. The cleaning of tubing or other apparatus connected with the operation of an oil well shall be done in such a manner and in such a location that the wastes will not drain or be washed into a stream, and in such a manner that combustible wastes can and will be burned periodically, using proper precautions to control the fire.

G. All run tanks, separators, or siphon tanks shall be so located that salt water, oil, basic sediment (B.S.) or other wastes will be discharged into one or more sumps of adequate size to receive and settle the wastes, and so located as not to be washed out by stream flows. All such sumps shall be protected from being flooded by surface water, and shall be so located as to permit the wastes being burned or disposed of at a uniform rate, without any undue fire hazard. Any water from such sumps shall be discharged through a siphon or other suitable device so installed as to prevent any oil or petroleum residues from reaching the waters of the Commonwealth. Oil and petroleum residues shall be periodically burned using proper precautions to control the fire.

H. The back wash from the operation of water filters shall be settled in sumps or equivalent devices adequate to provide at least an eight-hour retention period, and so arranged as to provide quiescent sedimentation and the discharge of the clarified effluent free from settleable solids and substantially free from turbidity. The sludge from any sedimentation basins which precede the filter units shall be removed periodically and disposed of in such a manner as not to be drained or washed into the waters of the Commonwealth.

Section 8. Wastes from Other Wells.

A. At each well drilling operation there shall be provided a sump or other receptable large enough to receive all drill cuttings, sand bailings, turbid water having a turbidity in excess of 1000 ppm, or other polluting wastes resulting from the well drilling operations. Surface water shall be excluded from such sump or receptacle by means of diversion ditches on the uphill sides, or by other appropriate measures. After completion of the well the sump shall be so covered over or otherwise protected, or the contents of the receptacle shall be so disposed of, that the contents will not be washed into the waters of the Commonwealth.

B. Any waste oil, coal, spent materials, or other polluting substances shall be so disposed of that they will not be washed into the waters of the Commonwealth.

Section 9. Phenolic Bodies.

The Board requires the complete elimination of those chemicals generally known as phenolic bodies, comprising phenols, creosols, tar acids and similar taste-and-odor-producing substances, from waste waters discharged or permitted to run or flow into the Ohio River and its tributaries within the Commonwealth of Pennsylvania.

Section 10. Oil-bearing Waste Waters.

Waste waters discharged to the waters of the Commonwealth shall show no more than a slight iridescence and shall at no time contain more than 30 ppm of oil or such lesser amount as the Board may specify for a particular stream as being necessary for the proper protection of the public interests therein.

Section 11. Distillery Wastes.

Distillery waste waters shall be completely evaporated or shall be given such equivalent treatment before discharge to the waters of the Commonwealth as will remove not less than 95% of the five-day biochemical oxygen demand of the wastes.

Section 12. Tannery Waste Waters.

The process for the treatment of waste waters resulting from the vegetable tanning of leather, as set forth in the Report of the Tannery Waste Disposal Committee of Pennsylvania to the Sanitary Water Board, dated November 8, 1930, is declared by the Board to be reasonable and practicable, and such waste waters shall be treated by one or more of the steps set forth in the report, as may be required by the Board for each particular stream or location thereon.

Section 13. Cyanides.

At no time and under no circumstances may cyanides or other cyanogen compounds in any amount whatsoever be discharged into the waters of the Commonwealth.

Section 14. Toxic Substances.

All persons in responsible charge of the production, transportation, storage, use or disposal of toxic substances, which after entering the waters of the Commonwealth might endanger the public health or property, shall take all necessary measures to prevent such substances from reaching the said waters through accident, carelessness or intent, and failure to take such precautions will be deemed prima facie evidence of the maintenance of a potential nuisance and shall be subject to the penalties provided therefor by Section 309 of the Act of May 8, 1945, P. L. 435.

Section 15. Subterranean Disposal of Wastes.

A. The Board will, except as otherwise provided, consider the disposal of wastes into the underground as potential pollution unless the disposal is within such proximity of the surface that the wastes will be absorbed in the soil mantle and be acted upon by the bacteria naturally present therein before reaching the underground or surface waters.

B. Discharge of inadequately treated wastes, except coal fines, into the underground workings of active or abandoned mines is prohibited.

C. Discharge of wastes into abandoned wells is prohibited.

D. Disposal of wastes into underground horizons will only be accepted as an abatement of pollution when the applicant can show by the log of the strata penetrated and by the stratigraphic structure of the region that it is improbable that such disposal will be prejudicial to the public interest, but any such acceptance will be conditioned and will not relieve the applicant of responsibility for any pollution of the waters of the Commonwealth which may occur, in which case such disposal shall be stopped forthwith.

E. All new wells constructed for waste disposal are subject to the provisions of Paragraphs A and D aforesaid.

Section 16. Heated Wastes

A. The temperature of the waters of the Commonwealth shall not be increased artifically by amounts that shall be inimical or injurious to the public health or to animal or aquatic life or prevent the use of water for domestic, industrial or recreational purposes.

B. The heat content of discharges shall be limited to an amount that could not raise the temperature of the entire stream at the point of discharge above 93°F. assuming complete mixing. The heat content of discharges may be increased or further limited where local conditions would be benefited thereby.

C. Where downstream circumstances warrant, the area in which the temperature may be artifically raised above 93°F. will be prescribed.

D. A fishway will be required in streams receiving heated discharges where this is essential for the preservation of migratory pathways of game fish, or for the preservation of important aquatic life.

E. Paragraphs B and C do not apply to streams so impregnated with acid mine drainage that they cannot support a fish population typical of the region except for heated discharges which adversely affect domestic or industrial uses or secondary streams.

F. There shall be no new discharge to waters providing a suitable environment for trout if as a result the temperature of the receiving stream exceeds 58°F. or stream temperature, whichever is higher.

G. Reduction of the heat content of discharges to estuarial waters will be required where necessary to protect the public interest. Estuarial waters are those containing ocean salts. Tidal waters not containing ocean salts are considered as fresh water streams.

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RULES AND REGULATIONS
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Article 700

Mine Drainage

Article 700 Mine Drainage

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 700

Mine Drainage

Section 1. General Provisions.

A. The discharge of acid mine drainage to the clean waters of the Commonwealth after May 8, 1945, is prohibited.

B. Prior to the Board's action on an application for a permit for a new mine, or for one re-opened since May 8, 1945, approving a plan of the proposed drainage and disposal of industrial wastes and acid mine drainage from such mines, the Division of Sanitary Engineering shall report to the Board any public water supply purveyor whose source of water may be adversely affected by the operation of said mine. If action is taken to authorize the issuance of said permit, such water supply purveyors shall be so notified and shall have ten (10) days from receipt of service of such notice to request a hearing. In the absence of a hearing, the permit may be issued only if such purveyors agree in writing to the issuance thereof or fail to request a hearing within the ten (10) day period.

C. Applications for deep mining operations shall be separate and apart from applications for strip or highwall mechanical mining operations, and no application shall be reviewed nor permit granted where deep and strip or highwall mechanical mining operations are included in the same application.

D. Certificates of approval, subject to the appropriate conditions, may be issued to proper plans of drainage and disposal of industrial wastes in the case of mines which were in operation prior to May 8, 1945, and which have been in continuous operation since that date. Beginning January 1, 1953, in each case hearing will be ordered and applicant must substantiate facts with proper legal documentation.

E. The name of a permittee or certificate holder may be changed upon application to the Department provided that:
1. The mine is in operation or operation has been suspended because of:
    a. an act of God
    b. miners' holiday
    c. strike
    d. lack of orders with workable equipment left on the site or in the mine
2. No operation of either party is in violation of the Clean Streams Act, rule, regulation, order of the Sanitary Water Board or any permit condition.
3. The permit is not an experimental permit.

Section 2. Discharge to Polluted or Unclean Stream.

In those cases in which the proposed discharge of the drainage would be to an already polluted or unclean stream, or to an insignificant clean stream not devoted to public use and which in turn flows into a polluted stream, the Board may grant a permit subject to the appropriate conditions.

Section 3. Discharge to Clean Stream.

A. In those cases in which the proposed drainage would be into a clean stream and there is no evidence that the drainage will be acid, the Board may, unless there is presumptive evidence of potential pollution of the waters of the Commonwealth, grant a permit subject to the appropriate conditions including, inter alia, the requirement that:

1. There shall be no discharge of mine drainage in which the acid content, as determined to a pH of 8.0 by the hot phenolphthalein test, ex-

ceeds its alkalinity, as determined to a pH of 4.0 by the bromphenol blue test, or which contains objectionable amounts of iron.

2. The permit shall become subject to revocation in case of the discharge of acid or objectionable amounts of iron.

Section 4. Discharge to Polluted or Unclean Stream Which Flows Into a Clean Stream.

In those cases in which the proposed discharge would be into a polluted or unclean stream which in turn flows into a clean stream, the Board may, unless there is presumptive evidence of potential pollution detrimental to the public interests, issue a permit subject to the appropriate conditions including, inter alia, that the permit will be subject to revocation in the event that there is a discharge of acid mine drainage to the primary receiving stream in an amount which in any manner will cause the acid content of the secondary receiving stream or streams to which the primary stream discharges, as determined to a pH of 8.0 by the hot phenolphthalein test, to exceed its alkaline content, as determined to a pH of 4.0 by the bromphenol blue test, or will cause the secondary stream or streams to contain objectionable amounts of iron.

Section 5. Disposal of Acid-Forming Refuse From Strip Mines.

In order to protect the clean waters of the Commonwealth against acid pollution, all acid-forming refuse materials, including all rider, rooster, blossom, boney or other inferior coal, or sulphur-bearing substances disturbed during each cut of the operation, shall be separated from the rest of the spoil and spread along the bottom of the pit close to the base of the spoil pile along the low-wall side of the cut. Promptly after being so placed, the acid-forming materials shall be covered with a sufficient amount of clean overburden. The top surface of the cover shall be so graded that water will run off rather than soak into the backfill to reach the acid-forming refuse.

Section 6. Diversion of Surface Water on Strip Mining Operations.

All surface water which might otherwise drain into the stripping pit shall be effectively intercepted on the uphill side of the high-wall by suitable and adequate diversion ditches and conveyed by adequate channels or other suitable means for discharge to natural water courses outside the entire stripping operation. No drainage course shall be intercepted by the stripping operation, unless provision is first made for the conveyance of the natural drainage in an adequate enclosed water-tight conduit across the entire stripping operation for discharge to natural water courses. The intent of this condition is to minimize the entrance of surface water into stripping pits and to that extent prevent the discharge of acid drainage from the operation.

Section 7. Operations in Violation of Permit Requirements.

A. If, upon investigation, the Division of Sanitary Engineering finds a coal mine operating in violation of one or more of the provisions of the Sanitary Water Board mine drainage permit, the Chairman may, in his judgment, issue a notice informing the permittee of the nature and the extent of his permit violations and advising him that unless the violations are removed by a specified date, the case will be referred to the Sanitary Water Board at its next meeting for revocation of the drainage permit, and such other action as the Sanitary Water Board may see fit to take.

B. Reinspection of the mining operation by the Division at an appropriate date may disclose one of the following situations. The action to be taken in each case is also indicated.

1. If, prior to the revocation of the permit, the reported violations have been satisfactorily corrected, the Chairman shall so notify the operator and inform him that no further action will be taken.
2. If, after revocation of the permit, it is found within a reasonable time that the reported violations have been satisfactorily corrected, the Division will so certify in writing to the Chairman of the Sanitary Water Board; who, in his judgment, is authorized to reinstate the permit, subject to ratification of such action by the Sanitary Water Board at its next meeting.
3. If, after revocation of the permit, the permittee fails within a reasonable time to correct the permit violations, the Chairman of the Board is authorized to refer the case to the Assistant Attorney General for appropriate action.

Section 8. Experimental Mine Drainage Permits for Strip Mines.

A. The Board may from time to time issue mine drainage permits for strip mines on an experimental basis. Such permits will contain special conditions as approved by the Board.

B. The Board reserves judgment in the issuance of such permits to other operations or in modifying the conditions thereof until a sufficient period of time has elapsed to demonstrate their usefulness in permitting the strip mining of coal in situations where special precautions are necessary to prevent pollution of waters of the Commonwealth.

Section 9. Coal Mine Operations Abandoned Before Applications Have Been Acted Upon.

A. If the Division of Sanitary Engineering learns that a coal mine operation has apparently been abandoned before action on its permit application has been taken by the Sanitary Water Board, the Chairman of the Board will direct a letter to such mine operator inquiring whether or not the operation has in fact been abandoned.

B. If the operator confirms that the operation has been abandoned or if ten (10) days after the transmittal of such notice no reply has been received from the operator, and the Division's records indicate that there is no discharge of acid mine drainage to a clean stream, the Division will recommend to the Board that the application be returned to the applicant without action.

Section 10. Placard Posting at Mining Operations.

All mines operating under permit from the Sanitary Water Board shall display an appropriate placard in a prominent place on each operation during the life of the operation. Failure to post a placard will result in revocation of authority to operate.

Section 11. Statement-Time of Starting Mining Operations.

Effective October 1, 1957, all operators of mining operations are required to notify the Board within thirty (30) days of the period of commencement of operations on a card which is attached to the permit.

Section 12. Time Limit for Starting Mining Operations.

On or after October 1, 1957, all permits for mine drainage issued by the Sanitary Water Board shall become null and void two (2) years from the date of the permit unless the mine has started in production, or unless an extension of time shall have been granted by the Sanitary Water Board upon written request of the permittee within sixty (60) days of the expiration date of the permit.

Extensions of time may be granted for one (1) or two (2) years, but in no case shall such extensions exceed a total of four (4) years.

Section 13. Mining Operations Without a Permit.

A. Cease and Desist orders may be issued by the Board in cases where an operator begins operation or is found to be operating a mine without receiving a permit therefor from the Sanitary Water Board.

B. The Chairman of the Board may issue such Cease and Desist orders on an ad interim basis and such orders shall be reported to the Board at its next meeting for ratification.

C. A copy of every report and Cease and Desist order referred to herein shall be submitted to the Assistant Attorney General who will take action appropriate to the situation in each case.

SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 800

Special Regulations

Article 800 —Special Regulations

Section

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SANITARY WATER BOARD
RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA

Article 800

Special Regulations

Section 1. Notice Concerning Endangering Waters of the Commonwealth

Whenever, because of an accident or otherwise, any toxic, or taste-and-odor producing substance, or any other substance which would endanger downstream users of the waters of the Commonwealth, or would damage property, is discharged into these waters, or is so placed that it might flow, be washed, or fall into them, it shall be the responsibility of the person at the time in charge of such substance to forthwith notify the State Department of Health by telephone of the location and nature of the danger, and it shall be his further duty to immediately take all practical steps to prevent injury to property and downstream users of said waters.

Note: Telephone calls should be directed during business hours first to the Regional Offices at the following numbers:

REGION I— Kingston - BUtler 8-6474 for the following counties:

- Columbia
- Lackawanna
- Luzerne
- Monroe
- Pike
- Susquehanna
- Wayne
- Wyoming

REGION II— Williamsport - 323-3746, Ext. 23 for the following counties:

- Bradford
- Cameron
- Centre
- Clearfield
- Clinton
- Elk
- Lycoming
- McKean
- Potter
- Sullivan
- Tioga

REGION III— Meadville - 6-1191 for the following counties:

- Armstrong
- Beaver
- Butler
- Clarion
- Jefferson
- Crawford
- Erie
- Forest
- Indiana
- Lawrence
- Mercer
- Venango
- Warren

REGION IV— Pittsburgh - EXpress 1-2100, Ext. 607 for the following counties:

- Allegheny
- Fayette
- Greene
- Somerset
- Washington
- Westmoreland

REGION V— Lewistown - 24-8-6785 for the following counties:

- Adams
- Bedford
- Blair
- Cambria
- Cumberland
- Franklin
- Fulton
- Huntington
- Juniata
- Mifflin
- Perry
- York

REGION VI— Reading - FRanklin 3-5175 for the following counties:

- Berks
- Carbon
- Dauphin
- Lancaster
- Lebanon
- Lehigh
- Montour
- Northampton
- Northumberland
- Schuylkill
- Snyder
- Union

REGION VII— Philadelphia - LOcust 8-400, Extensions 8172 and 8173 for the following counties:

- Bucks
- Chester
- Delaware
- Montgomery
- Philadelphia

In the event no contact with the Regional Office is made, the Capitol operators at Harrisburg, CEdar 8-5151, will receive such telephone calls both during and after business hours, 24 hours daily, weekends and holidays included.

Section 2. Responsibility of Owners of Impounded Wastes.

The retention of wastes of a polluting character on private land does not violate the anti-pollution laws so long as the wastes do not reach the waters of the Commonwealth. However, it is the responsibility of those in control of such wastes to see to it that the retaining structures are in condition to prevent the wastes from reaching such waters through carelessness, or maliciousness of themselves or others, through action of animals or through the hazards of weather, and failure to maintain the structures in the required condition will render such parties liable to the prescribed penalties in case of the pollution of the waters of the Commonwealth by such wastes.

Section 3. Use of Algaecides and Germicides.

A. The presence of algae in sources of water supply is the cause of offensive tastes and odors in the water as used by the consumers, and thereby constitutes an indirect menace to the public health, and the most effective remedial measure to control algae is by the proper use of copper sulfate.

B. Also, bathing in streams tributary to reservoirs which are the source of unfiltered public water supplies constitutes a direct menace to the public health, and the usual method for reducing such menace is by the proper use of chlorine as a germicide.

C. Therefore, the reasonable use under the direction or with the sanction of the Department of Health, of copper sulfate as an algaecide in reservoirs, lakes or ponds used as sources of public water supply, or of chlorine as a germicide in bathing pools on streams tributary to reservoirs which are the source of unfiltered public water supplies, shall not be deemed a violation of the anti-pollution laws.

Section 4. Camps on State Forest Lands.

The Sanitary Water Board approves the joint policies of the Department of Health and the Department of Forests and Waters relative to camping on State forest land used as a catchment area for public water supply, as the said policies are set forth in Exhibit HD 10 under the title, "Procedure for Control of Camping on Watersheds of Streams in State Forests from which Water Supplies are Taken for the Public Without Filtration" attached to the report of the Engineers Committee to the Board, dated July 1923.

Section 5. Protection of Wallenpaupack Lake from Pollution.

No sewer or drain shall be constructed or maintained across the marginal strip of the shores of Wallenpaupack Lake, nor shall any sewage, industrial wastes, or any other polluting substance be discharged to said Lake or tributary streams thereof except as follows:

> The location of any such sewer or drain and point of discharge shall be subject to approval by the Sanitary Water Board in a written permit wherein the conditions under which such sewer or drain may be constructed and maintained shall be stipulated.

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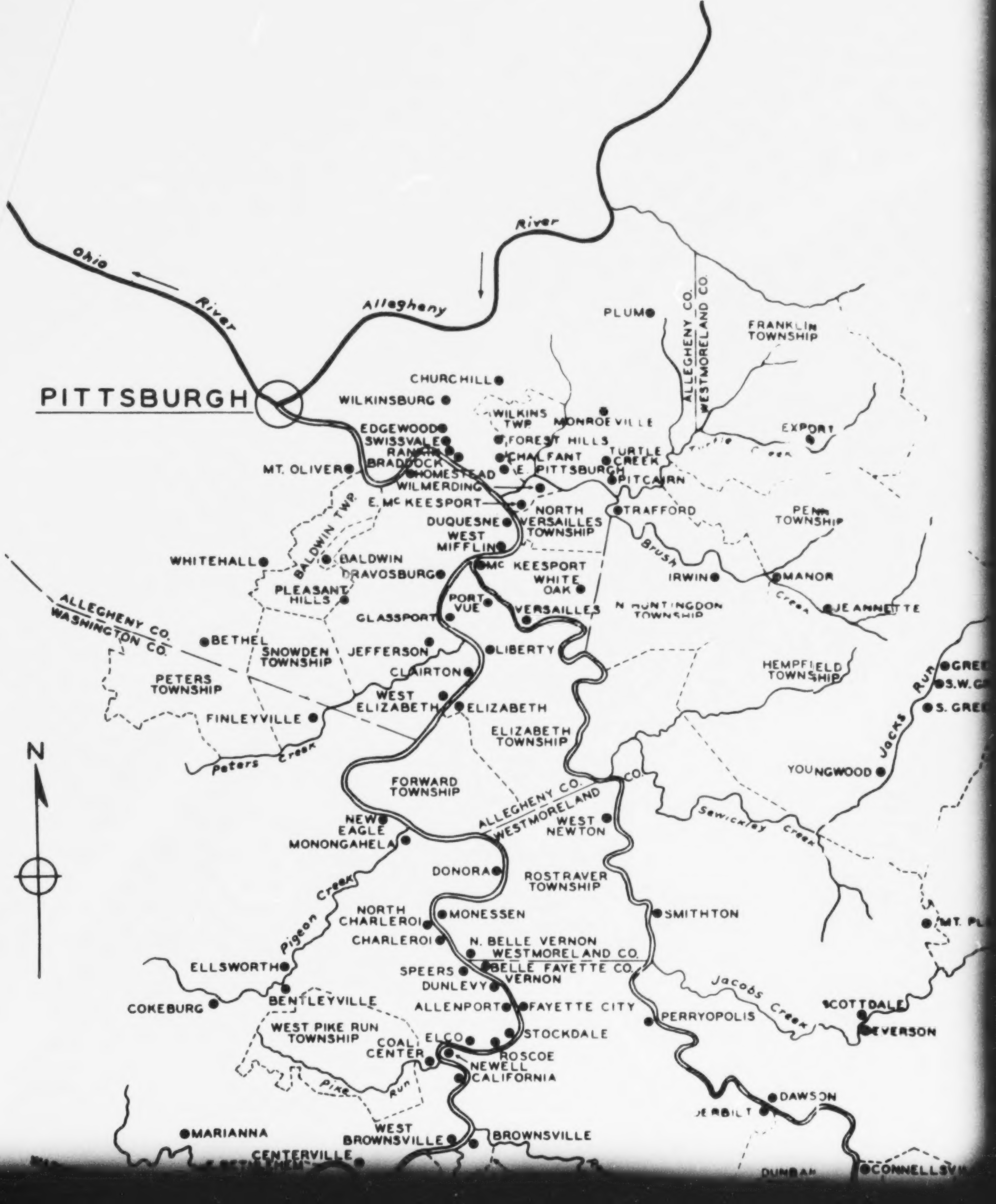
A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Ohio River
Allegheny River
PLUM
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WESTMORELAND CO.
FRANKLIN TOWNSHIP
CHURCHILL
WILKINSBURG
WILKINS TWP
MONROEVILLE
EDGEWOOD
SWISSVALE
RANKIN
BRADDOCK
HOMESTEAD
FOREST HILLS
CHALFANT
TURTLE CREEK
E. PITTSBURGH
EXPORT
Turtle Creek
MT. OLIVER
WILMERDING
PITCAIRN
E. McKEESPORT
NORTH VERSAILLES TOWNSHIP
TRAFFORD
PENN TOWNSHIP
DUQUESNE
WEST MIFFLIN
BALDWIN TWP.
BALDWIN
WHITEHALL
DRAVOSBURG
McKEESPORT
WHITE OAK
Brush Creek
IRWIN
MANOR
PLEASANT HILLS
PORT VUE
VERSAILLES
N. HUNTINGDON TOWNSHIP
JEANNETTE
ALLEGHENY CO.
WASHINGTON CO.
GLASSPORT
BETHEL
SNOWDEN TOWNSHIP
JEFFERSON
LIBERTY
CLAIRTON
HEMPFIELD TOWNSHIP
Jacks Run
GREE
S.W. GR
S. GRE
PETERS TOWNSHIP
WEST ELIZABETH
ELIZABETH
FINLEYVILLE
ELIZABETH TOWNSHIP
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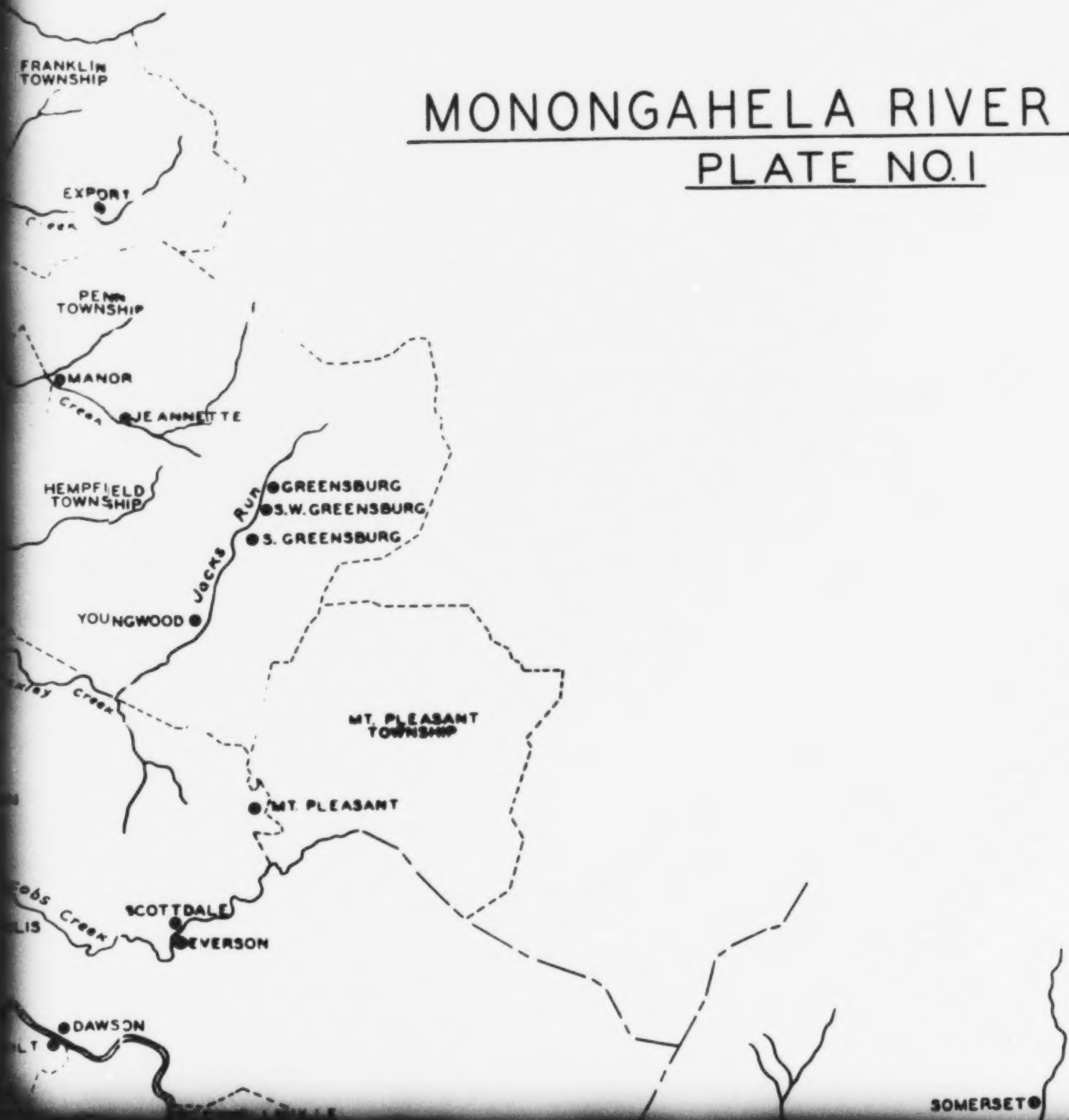
YOUNGWOOD
FORWARD TOWNSHIP
ALLEGHENY CO.
WESTMORELAND CO.
WEST NEWTON
Sewickley Creek
NEW EAGLE
MONONGAHELA
DONORA
ROSTRAVER TOWNSHIP
Pigeon Creek
NORTH CHARLEROI
MONESSEN
SMITHTON
MT. PL
CHARLEROI
N. BELLE VERNON
WESTMORELAND CO.
ELLSWORTH
SPEERS
BELLE VERNON
FAYETTE CO.
DUNLEVY
Jacobs Creek
COKEBURG
BENTLEYVILLE
ALLENPORT
FAYETTE CITY
SCOTTDALE
PERRYOPOLIS
EVERSON
WEST PIKE RUN TOWNSHIP
ELCO
STOCKDALE
COAL CENTER
ROSCOE
NEWELL
CALIFORNIA
Pike Run
DAWSON
VANDERBILT
MARIANNA
WEST BROWNSVILLE
BROWNSVILLE
CENTERVILLE
DUNBAR
CONNELLSVILLE

B

MONONGAHELA RIVER BASIN

PLATE NO.1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S. GREENSBURG
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MT. PLEASANT
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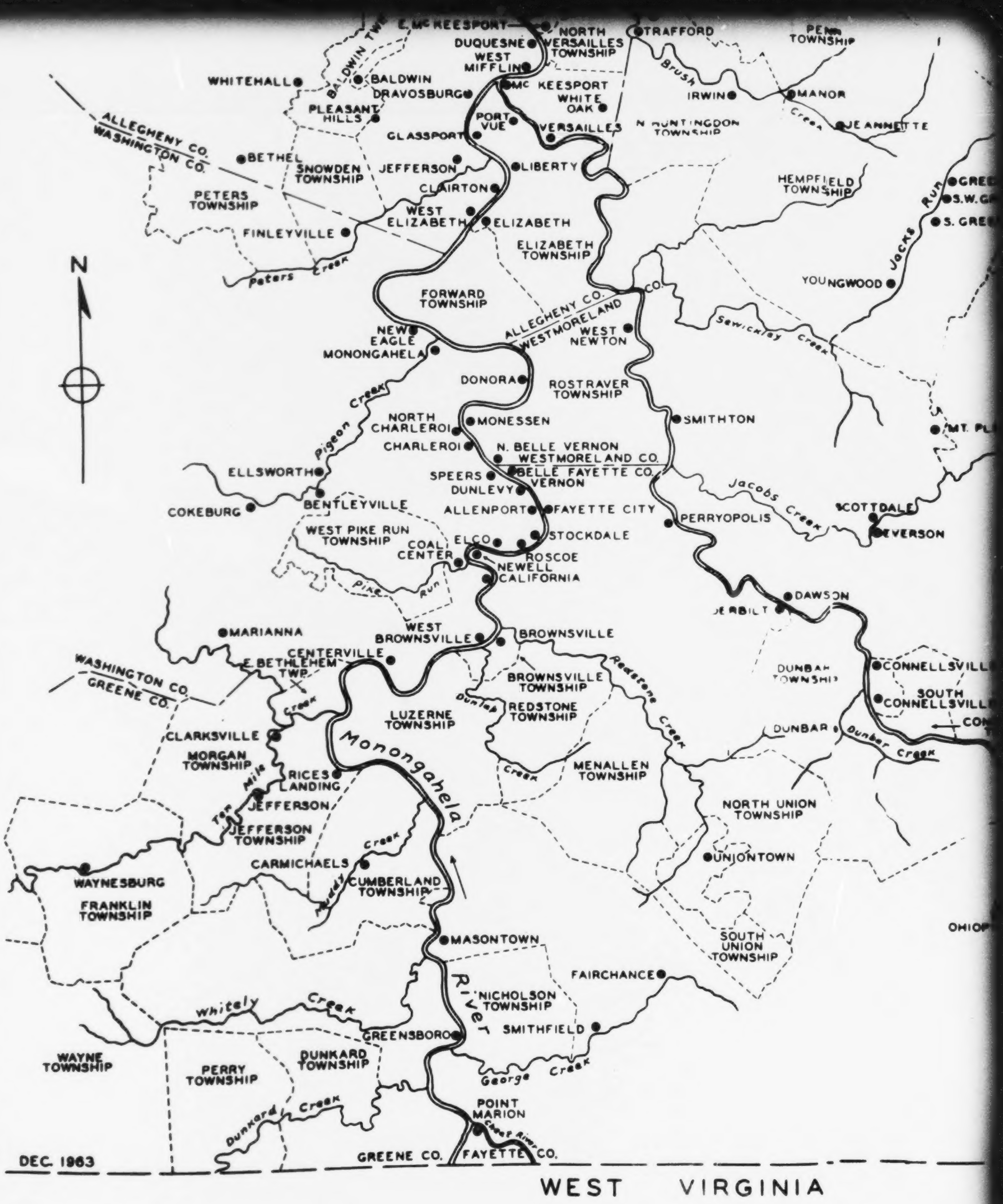
SCOTTDALE
EVERSON
DAWSON
SOMERSET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Pike Run
DAWSON
VANDERBILT
MARIANNA
WEST BROWNSVILLE
BROWNSVILLE
CENTERVILLE
E. BETHLEHEM TWP.
WASHINGTON CO.
GREENE CO.
Redstone Creek
DUNBAR TOWNSHIP
CONNELLSVILLE
BROWNSVILLE TOWNSHIP
SOUTH CONNELLSVILLE
REDSTONE TOWNSHIP
LUZERNE TOWNSHIP
Dunlap Creek
CLARKSVILLE
Monongahela
DUNBAR
Dunbar Creek
MORGAN TOWNSHIP
MENALLEN TOWNSHIP
Ten Mile Creek
RICES LANDING
JEFFERSON
NORTH UNION TOWNSHIP
JEFFERSON TOWNSHIP
Muddy Creek
CARMICHAELS
UNIONTOWN
WAYNESBURG
CUMBERLAND TOWNSHIP
FRANKLIN TOWNSHIP
OHIOPYLE
MASONTOWN
SOUTH UNION TOWNSHIP
FAIRCHANCE
NICHOLSON TOWNSHIP
Whitely Creek
River
SMITHFIELD
GREENSBORO
WAYNE TOWNSHIP
PERRY TOWNSHIP
DUNKARD TOWNSHIP
George Creek
POINT MARION
Dunkard Creek
Cheat River
GREENE CO.
FAYETTE CO.
WEST VIRGINIA

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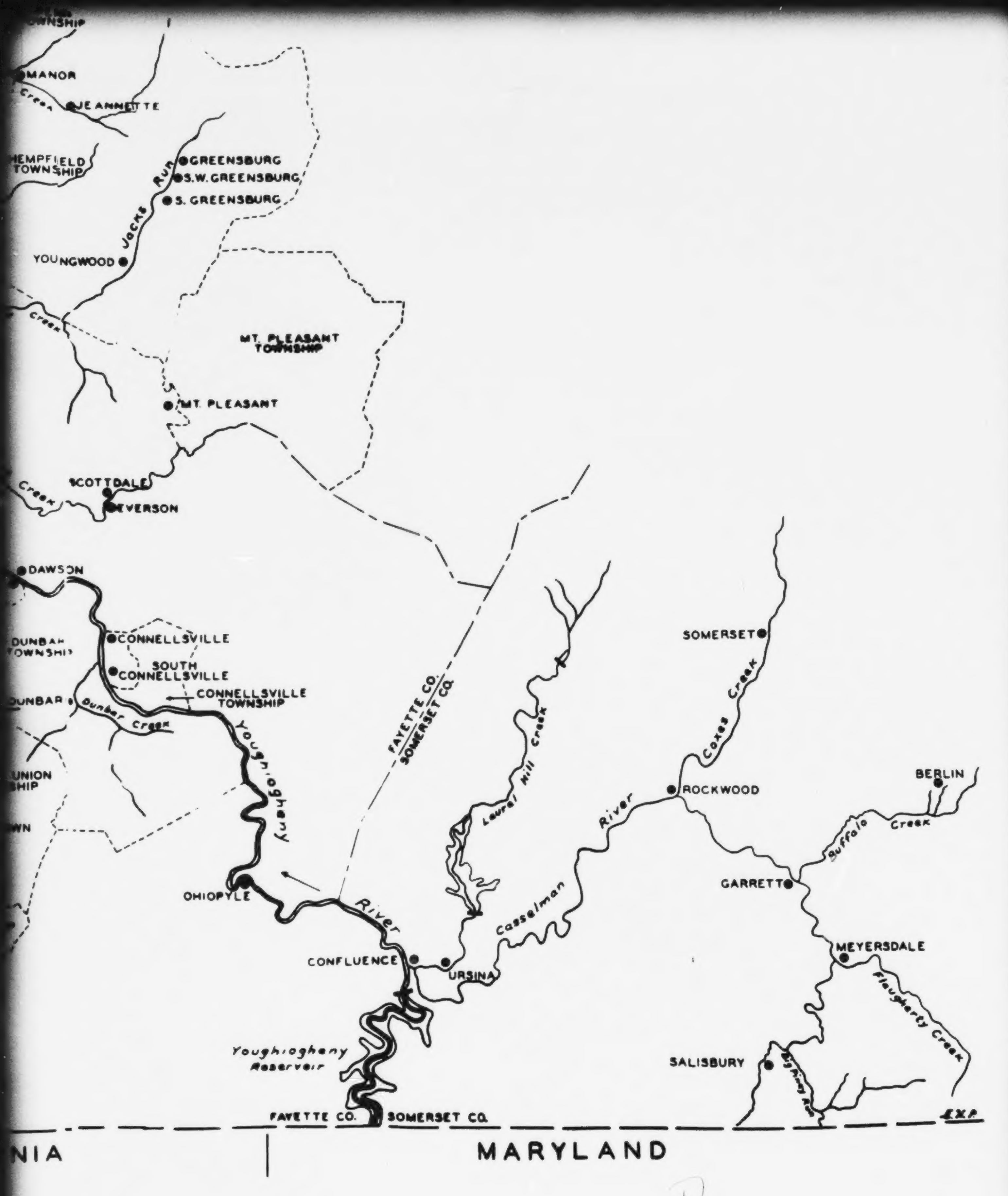
TOWNSHIP
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CONNELLSVILLE TOWNSHIP
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Dunbar Creek
UNION TOWNSHIP
Youghiogheny
OHIOPYLE
River
FAYETTE CO.
SOMERSET CO.
Laurel Hill Creek
SOMERSET
Coxes Creek
ROCKWOOD
BERLIN
Casselman
River
Buffalo
Creek
GARRETT
CONFLUENCE
URSINA
MEYERSDALE
Flaugherty Creek
Youghiogheny Reservoir
SALISBURY
FAYETTE CO.
SOMERSET CO.
E.X.P.
NIA
MARYLAND

MR. STEIN: Thank you, Dr. Wilbar, for a very comprehensive report.

(Applause.)

MR. STEIN: Is it to be assumed that you want the whole report in the record, including the tables?

DR. WILBAR: Yes, sir.

MR. STEIN: This will be done. Since this is the first report we have received in advance, I didn't know that Mr. Whetstone also had a rather extensive report and he just read portions of it. Without objection, I see no reason why we can't put that whole report in the record too.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, we would like to recess for lunch and reconvene promptly at two-thirty.

(Whereupon the conference recessed for lunch.)